FARM BUILDINGS

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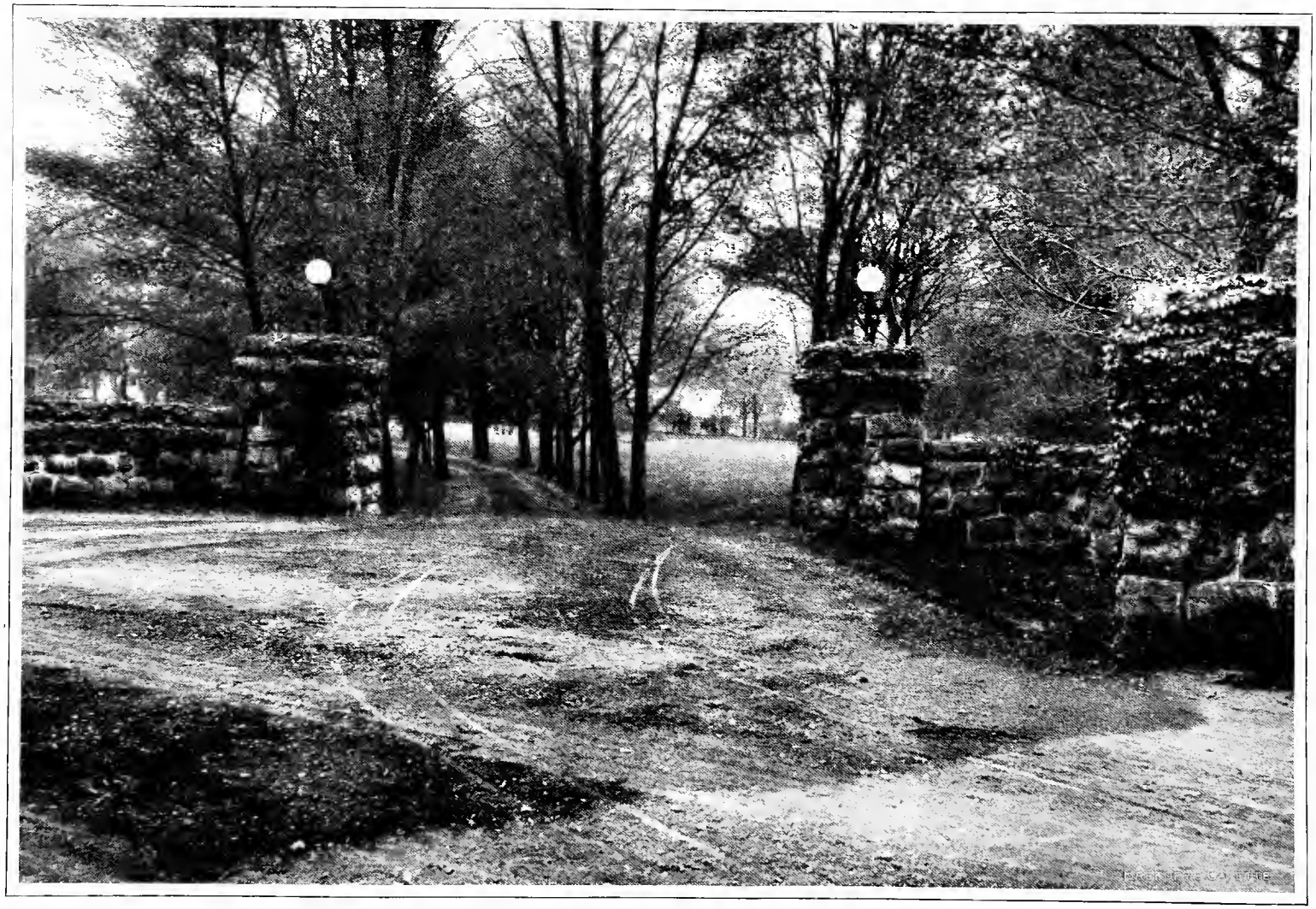

"ABANDON CARE ALL YE WHO ENTER HERE."

A Stone Gateway on the Havemeyer Farm, New Jersey.

FARM BUILDINGS

A COMPILATION OF
PLANS FOR GENERAL FARM BARNS, CATTLE BARNS, HORSE BARNS, SHEEP FOLDS, SWINE PENS, POULTRY HOUSES, SILOS, FEEDING RACKS, ETC.
ALL REPRESENTING CONSTRUCTION IN ACTUAL USE.

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PUBLISHER'S NOTE.

THIS is not a book of proposed plans for farm buildings, but for the most part is a presentation of actual construction by practical men. It is in the main a compilation of the best plans contributed to THE BREEDER'S GAZETTE by the farmers and stockmen of the United States in recent years. Many different types are illustrated. Different farms, different latitudes and different methods of management demand an infinite variation in the style, dimensions and detail of American farm buildings.

In barn building as in the planning of the farm home, nearly every individual has his own peculiar ideas and tastes. It is rarely that one is entirely satisfied with what a neighbor has done in such matters. At the same time it is clear that many general propositions and many matters of detail possessing real value to a prospective builder may be gleaned from a study of what successful farmers in different parts of the country have already carried out.

In the belief that many helpful hints will be found in these pages and to fill a persistent demand for information upon the subject treated the publishers present this compilation with full confidence that it will meet with general appreciation.

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FARM BUILDINGS.

LOCATION AND GENERAL ARRANGEMENT.

The planning and construction of farm buildings should be done with regard to the surrounding outside features as much as to the interior arrangement and convenience of the rooms. It is a common error to see little forethought taken in the placing of the buildings, in their relation to each other or to the surrounding conditions; the total disregard of a fine outlook that may have been had from the windows that are most frequented; many errors in the proper way to approach the house from the highway, and many times the utter absence of any attempt at ornamentation in the way of tree planting—nothing save bare sides and sharp angles of buildings open to all winds, storms and sun heat, or the opposite extreme, burying the house in a dense shade of loneliness.

Now this should not be so. When the advantages and increased value of the property as a whole are considered it is at once apparent. Any one can distinguish between a nice farm, a place where it would be a pleasure to live, and on the other hand one that is bare and uninviting. The cost is a matter of forethought on the part of the individual at the beginning in the planning of the work, and the actual material to be used in beautifying the grounds almost always can be had for the gathering. One may easily find the time to do the work when once he has tasted of the pleasures there are in surroundings that are made attractive with trees and plants arranged to make a landscape that is ever improving and changing in scene.

When a beginning is made toward embellishment of the home surroundings then there is a new birth given, the feeling of attachment that reflects back into pleasant and longing recollections of the happy lives passed there, and the far-reaching influence of cheerful home surroundings on the character and future life of the growing generation toward the good and high of ideal life is above any estimation, besides being a source of interest and everlasting joy and pleasure alike to the owner and to all who enter here.

Farming is not all corn. There are many fine farms that are only such from the fact that there is a quiet natural park-like effect resting over the home place and if favored with a fertile soil and a kind climate how much more blest we could be if we would bring about us more of the natural beauties so abundant everywhere. This need not detract an instant from the economical operation of the farm but if practically planned should add many fold thereto.

We can assume that the residence and other buildings are already placed, or that building is to be done at some future time. With respect to the all-important question of choosing the house site, the custom in the city seems to be the law without recourse in the country, in that the house must stand facing square, with the best rooms toward the public road. If a better exposure or a fine scene lies in another direction, reverse the order regardless of the highway. Again, houses are dropped in a hollow, carried to the top of a bare hill, or placed too near dusty roads or stables, making things more disagreeable than convenience would compensate. The house should not be put on a poor or waste piece of ground just to gain a little extra tillable land.

Personal preferences should of course be taken into consideration, but as a rule many desirable locations are ignored. Among the specific directions to apply in selecting the home site are good sanitary conditions. These demand air and quick drainage of water. All this is secured on a dryish soil, slightly elevated if possible and fairly open to admit a free circulation of air. Any protection against prevailing north and west winds in the winter season, such as hills, trees or any other natural objects in the track of regular storms, should be made use of, but cool and refreshing winds should not be hindered in their direction during the heated season.

The distance from the highway is hardly a matter of importance. If the best place is 400′ from the road it ought to be chosen over another less desirable, though 200′ nearer. Besides this an entrance approach of reasonable length, if properly laid out among a grove of trees, will add much to the dignity and bearing of the place. The relation of the house and barn should be such that they do not appear as a part of each other and in driving to the house one is not led first through yards and past gaping barn

doors. The barn should occupy a position so that the prevailing winds will carry the stable odors in a direction away from the house and not toward it, as is often the case. The exact position and arrangement of the out-buildings and enclosures will be according to their use, and to be convenient should be few and compact and not scattered over a whole area. Pens, sheds and stacks should not be conspicuous in a general front view.

In country houses broad simple design is much to be preferred. All about a house of this order there is a quiet dignity and homelike restfulness that is in pleasing harmony with every rural landscape. The rooms should be few and large. The veranda is right if one step up from the ground and at least 10′ wide, and a porte-cochere or carriage porch should be a part of every country house, as it surely is a comfort when rainy or windy to drive up to the door under a roof. Especially is the excessive use of all "ginger-bread" mill work in gable ornaments, railings, brackets and the like to be discouraged, as such detail soon falls into decay and is a constant item of repairing and the greater part of it is vulgar and meaningless. Likewise the use of many discordant colors in outside painting is not in keeping with surroundings; a modest neutral shade that blends with the fields and trees is the correct one. Red is a good and cheap color for barns and possibly for houses also, but it should be shaded down and the glare and flash taken off.

Features of the natural landscape should receive great consideration, as it is these that give character to the farmstead. A grove of noble trees on a slight eminence would at once suggest the future home site. In the choice of views here is a suggestion as to the points of interest: first would come the immediate surroundings made beautiful with lawn, trees and shrubs, and farther out the adjacent fields of growing crops or pasturing animals are constantly in mind. The neighboring farm houses, the travel on the highway, or a speeding railroad train are all of every-day attraction. The landscape that is characteristic of the particular country, a broad far prairie scene that holds hands with the horizon beyond; hills or woodlands bounding the view with their picturesque sky line, a river or winding stream with wooded shores and spanning bridge or a lake of broad expanse and quiet surface—all these are everlasting scenes of delight and inspiration.

Now as a practical demonstration of how a farm can be developed in a complete and intelligent manner, reference to the example shown by the plan will serve to clinch the essential points mentioned. The plan represents a general scheme for the layout of a 160-acre prairie farm. There are no trees on the tract of any importance; the surface is slightly rolling with no prominent elevations anywhere—in all a typical grain and stock farm; corn, oats, some wheat, hay and pasturage, almost all sold off in the finished products of beef and pork. It is believed that this scheme comes very near an economical use of all of the land combined with a beautification of the home surroundings, a park-like entrance and approach drive, a commanding position for the house and the farm buildings centrally located and accessible from all parts of the premises.

The house is placed in a ten-acre piece, which may be properly called the home plot. Here are collected all the buildings (except the barn and feeding lot), orchard, vegetable and fruit garden, shaded lawn, flowers and all that goes into daily life. This plan leaves no waste ground; everything is compactly arranged and yet in such a manner as to allow the extension of any particular part without interfering with another.

The residence is about 700′ from the highway and stands in the southwest corner of the home plot, the ground sloping off gently to the south. All the main rooms have a south and east exposure. It is approached from the public highway on a curve which is in the direction of the most traffic (the city in this case). This is a much better way than entering at right angles and adds greatly to the appearance of the entrance and does not allow a direct view up the drive from the road. The drive slants over until within about 20′ of the fence; it then parallels the fence in a straight line to the barn. A short distance from the house a branch road leads over on a gradual curve to the carriage porch, passing underneath it; the curve then continues and joins the main road to the barn. By placing the house about 70′ or so from the main drive all clatter and noise of teaming is to a large degree shut away from contact with the rooms and a nice lawn space comes up to the house on that side. This entrance road is ten feet wide, the branch nine feet, graded with gravel from a near-by pit and smoothly surfaced off with a crown just sufficient to turn the water.

The barn is 250′ from the house and is set 40′ into the ten-acre pasture to the west, with a silo on the north side convenient alike to the barn and feeding lot. Another building is put up 80′ directly east for general storage purposes of machinery, wagons, supplies and repair shop. The space between the barn and storage house should be drained and bedded with gravel to serve as a general movement yard and entrance for both buildings; a place to set up the shredding outfit, grinding, unloading and

the like. Water is piped into this yard and to the house from the tank and well just back of the storage house. A poultry shed is at the north of this building.

A good big orchard contains about 125 trees, including apples, pears, plums and cherries, which will give plenty of fruit for home use and much to sell. A fence is run along the lower side of the orchard; then the pigs can be turned in any time to consume the fallen fruit, although the trees will be cared for the same as a crop of corn. One acre is given to small fruits. The grapes are put next the orchard because they are more permanent than the raspberries and blackberries, which can be moved back and forth into the nursery ground when they get old and worn out in one place; currants and gooseberries are also planted. The strip for nursery purposes does good service in growing trees and bushes to set out in the future. A row of hot-beds and frames is useful in many ways; it is protected along the north with evergreen trees. The vegetable garden of one and one-quarter acres will give abundance of good things and all that is left over the pigs will take as dessert. The strawberry patch is moved about the garden every year or

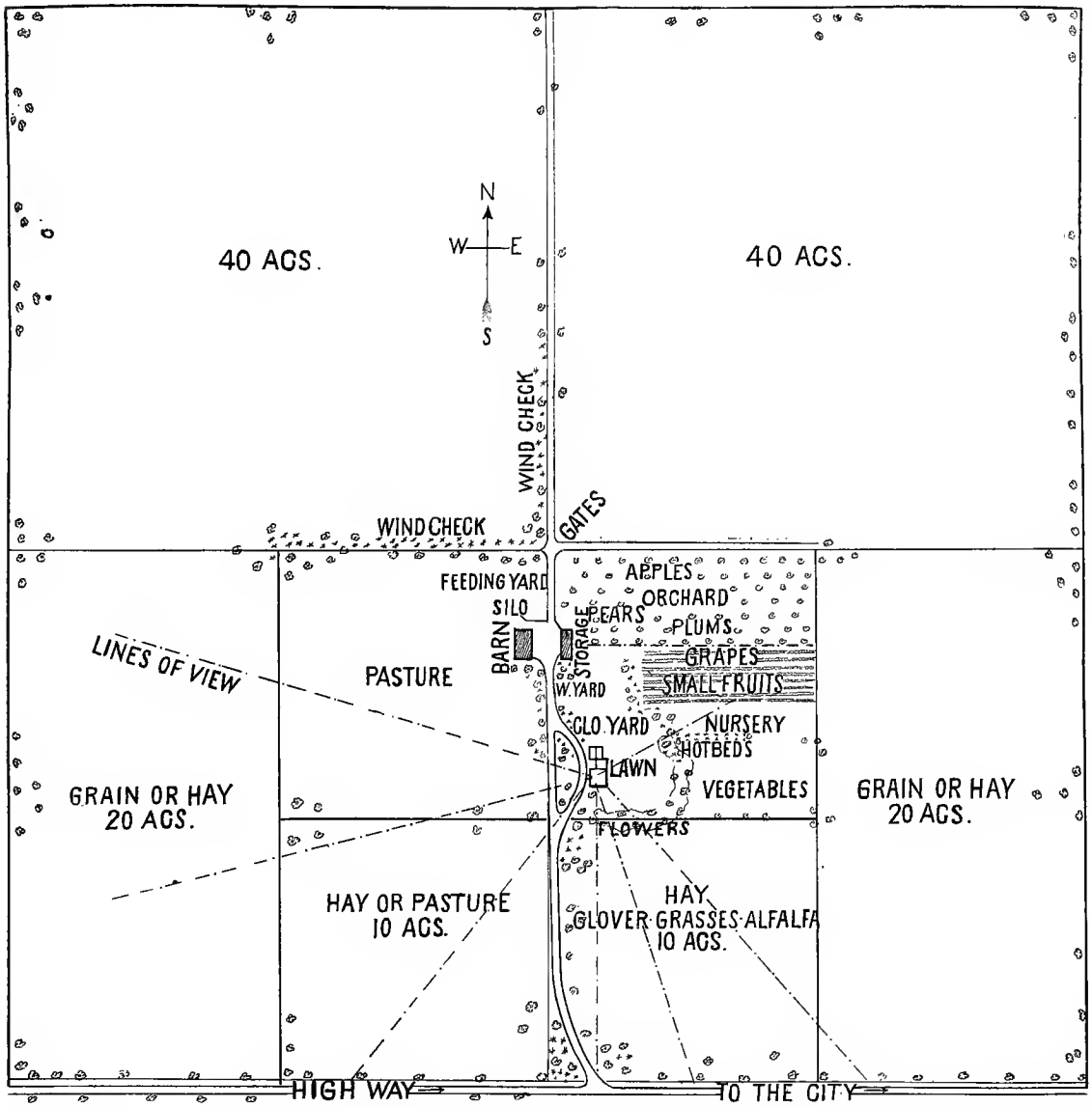


FIG. 1—PLAN FOR LAYING OUT A 160-ACRE FARM AND FARM HOME.

two. Asparagus and rhubarb are along the fence.

A lawn space bounds the house on all sides, varying in width from 150′ to 200′. It is not necessary, however, to keep it closely mown. In the rear the grass covers the clothes-drying space; further back are the beehives and a place for the wood pile. The grounds about the house are planted with trees for shade and beauty; a place for children to play and climb and a source of recreation and ease for the older members of the family. As to the kinds used for this purpose: in making the ground work or foundation of the scene use such native trees as are found growing in the immediate locality; elms, maples, lindens and ash are in greater abundance. All these trees are reasonably quick in growth, bear transplanting well and will therefore prove a success from the start. Hawthorns, wild cherries, plums and crab apples, juneberry, dogwood and redbud are planted in the places to thicken up and mass with the other trees; occasionally they appear in detached groups or specimens by themselves. They will lend variety and charm to the surroundings in the springtime with their white, pink and red flowers, and in the autumn many of them close the growing season with a contrast of scarlet fruits and golden-hued foliage.

Along the entrance road the work is done in a like manner. Evergreen trees—pines and spruce—are planted in clumps; at the left hand side of the entrance gate is one group, farther up on the other side another. On the west and northwest sides of the house are thick groups to lessen the prominence of the barn, to check cold winds and vary the effect with the deciduous trees. Trees are placed along those sides of the barn; seen from the highway they will soften the blank barn side and give a proper setting to the building as a whole. The gable and tower appearing among the tree tops will mark a distinctly rural scene. To protect the buildings and feeding lots somewhat against the direct force of cold northwest winds groups of Norway spruce are planted in alternate groups with deciduous trees, as shown in the plan, north of the barn and act as a wind check.

The entrance gate should be set in at least thirty feet from the fence line, leaving an open space of 60′ to 70′ on each side of the drive, as shown in the plan. This space is planted with trees, and if an elm is planted on each side of the gate a beautiful arching effect will be had over the formal entrance to the place.

A tree to appear in all its natural beauty should spread its branches out and down to the ground on all sides. Never trim all the branches off and expose a bare stem, nor hack off the ends of branches and make a stubby, broom-shaped thing. If a good set of roots is dug with the tree no pruning is required. Pruning of ornamental trees is properly a thinning out in the center of minor twigs and branches. Let the tree develop into its own natural form. Cutting can never accomplish this.

Shrubs should be massed in a border along the entrance drive next to the fence, to add variety with their foliage and flowers at different times. An irregular massing of shrubbery forms a boundary belt along the east and south sides of the house. The lawn extends out on those sides to this border; along the edges next the grass is the place for hardy flowers, native perennials and any other favorites that are desired; here they will be in charming contrast with the lawn and bushes. The kinds of shrubs used are wild native species found growing in the neighborhood, such as dogwoods (the red-branched and others), sumach, elderberry, wild rose, Indian currant, snowballs, spiræa, lilacs, mock-orange and honeysuckles. Japan quince and forsythia are nice in places where they are seen from the windows, because of their early blossoms. So are those early flowering trees, such as juneberry, wild goose plum, Judas tree and dogwood. Such early spring flower scenes of color are delightful to children or invalids who are confined to the house until the weather becomes milder. Vines ramble all over the porch columns and up the fireplace chimney on the west side of the living room.

The views from the house are indicated by the converging lines. (Fig. 1.) Three different scenes are open from the living room: We have the veranda along the south and east sides of this room. To the west the sight is across open fields to the lowering sunset. Different openings through the trees give glimpses of the life on the highway. Out of the dining room the picture is one of sunlight and shadow, over the open lawn, under the trees to the color of flowers. The kitchen and rear porch are shaded in the summer; a walk connects them with the drive; storage room is ample; the office is handy to the drive and an outlook to the west; the carriage porch and entrance hall face west.

In conclusion we may say that the farm home stands as the central feature, with the barns in a subordinate position. They are then brought into harmonious relation with each other through the artistic planting of native trees. Orchard and gardens are grouped as nearby accessories and the grounds about the house are further enriched with shrubs and flowers. The drive and walks allow convenient and easy access to all places and lead in a natural manner to the highway. Along the highway and in groups about the boundaries and cross fences trees are planted as per introduction and outline.

THE MODERN BARN.

Do you want a barn? Have you any definite idea of what it is that you want? Have you carefully considered first your means, then your needs, then the needs of years to come? Is it your idea to build a small, cheap barn that will hold a few tons of hay, the grain, a few cows, the working horses, a colt or two, the farm machinery, the chickens and ducks? If that is your idea think whether it is economy to shelter farming tools on the barn-floor, which means that they are endlessly in the way and that they have a shed costing ten times what one would cost designed especially for such a purpose. No farmer can afford to build a barn with such a small storage capacity for forage that he will be compelled to fill it in summer and then re-fill it again and again during the winter and spring, drawing hay from the stacks, damaged in quality and at double the expense of putting it directly where it is to be used.

Is it not cheaper to make shingles shelter a depth of 20′ or 25′ of hay than a depth of 5′ to 15′? Consider whether it is real economy to combine into one barn all the shelter and storage room needed on the farm. There is fire to be considered and convenience in handling stock. Do you wish the colts or cows to run in the yard with the pregnant ewes? Do you wish to mix breeding sows and small lambs?

The barn must fit the farm and the needs of the farmer. It is folly to insist that any one type of building is of universal suitability. There is this thought to consider when building a barn: Building is one of the great events that come far apart. After a new barn is built it is not likely that one can afford to add to it or build another for many years. Build, then, of sufficient size and capacity to allow for a reasonable growth and expansion of not merely the farm crops but the farm animals. Especially provide ample room for the storage of forage. Sheds may be cheaply constructed to surround the barn and these sheds will shelter the stock, and may be added at any time, but the storage room of the mow is a fixed quantity when the rafters are put on.

Notwithstanding the fact that barns must always vary in shape, size and arrangement, it is true that they will have certain things in common if they are modern and up-to-date.

Beginning at the foundation the modern barn has no sills under it. The basement posts rest directly upon stones, which are bedded well in the ground and should reach below the frost line. Sills near the ground are not merely unnecessary but a nuisance from every standpoint. They decay, harbor rats and obstruct. The modern barn has an earthen floor, preferably hard clay, or cement where necessary. The latter is cheaper than the wooden floor and has very many points of advantage. It conserves warmth, no cold drafts come under it, does not shelter rats, manures do not leach through it and it does not decay. Yet where sheep are to be sheltered or calves or cattle run loose no other floor is needed than the natural earth well bedded. Even horses prefer to stand on the ground and many of the most successful horsemen insist that their horses shall have earthen floors in their stalls.

The modern barn has a basement or lower story beneath its entire area used for sheltering farm animals. The reason for this is that it is in the line of economy; moreover, it is a great convenience to be able to drive through to clean out manure or for other purposes. There is also a free circulation of air through the basement when the windows are opened on opposite sides, there being no wall or mow of hay to oppose the air currents. Modern hay-lifting machinery makes it as easy to lift the hay above the basement as to drop it on the ground level.

In calling this lower story a basement it is not meant that it should be under ground. Where the ground is inclined and level positions are not easy to be had, the old-fashioned bank barn may be considered, yet in adopting this type it should be constantly borne in mind that stone walls are apt to be productive of disease germs, especially of tuberculosis, which thrive in a dark and poorly ventilated barn basement. However, the advantages of a bank barn may be had without sacrificing light or ventilation. Let the earth be heaped against the wall not more than 4′ or 5′ and above this provide numerous windows, all arranged to open wide. The ventilation of the basement must be carefully thought out according to climatic conditions and the kind of stock to be sheltered. This is a point against sheltering all sorts of animals together. Ventilation that is desirable for the sheep barn is very undesirable for the dairy cows.

The lighting of the basement is an important matter. Sunlight is the great purifier and destroyer of microbes and germs. It adds to the comfort of calves, lambs, and pigs as it comes

through the generous south windows during cold winter days. Glass is fortunately almost as cheap as siding. It will pay for itself many times over if used to let the sun in the barn basement. This also is true of the poultry-house. It is a commentary on the ignorance of a man that so often the farm animals will go almost anywhere rather than into the quarters he has provided for them. If the barn is built right and managed right the animals will need to be shut away from it rather than driven into it.

An important consideration is that the barn shall store an abundance of provender that may be easily and cheaply put in it. To this end the building must have depth of hay mow without cross-ties through the middle to obstruct the free working of the hay-carrier and fork or the use of slings. For the ordinary barn of about 40′ length the height from the level of the mow floor to eaves should be 20′ and the best width is between 30′ and 50′. The chief consideration is carrying the hay back from the center to the sides when filling the mow. The track on which the carrier runs should be directly in the center of the roof and the hay dropping below it will not easily be carried back more than 25′ and on the whole a width of 40′ or 45′ is preferable.

The roof should be what is termed a half-pitch; that is, the rafters inclined at an angle of 45 degrees, or the curb roof of two angles. The roofing material should be slate, good shingles or galvanized iron. Painted iron roofing is not very satisfactory.

Almost all manufacturers make carriers that hold the load and run it in at any desired height just to clear the floor or the level of the hay in the mow or up to the peak of the roof, according to the needs of the occasion. The use of such a carrier effects economy in time and power, and results in making better hay, for there is less mow-burning when hay is not dropped from a height.

It should be borne in mind that most barns are too small, too low, too inconvenient in arrangement, too uncomfortable to the animals, while some are too large (this is rare), and too ornate and expensive.

The day of the barn sill has gone. Instead the posts set directly on stone or piers of concrete made of cement. Between the post and the pier it is well to lay a block 2″ thick which will effectually prevent the absorption of moisture by the bottom of the post. Should this block decay it is readily replaced.

Posts should not come clear down to the floor level; the stones or piers should rise 12″ to 16 ″ to throw the post above moisture or manure, which may accumulate in cattle or sheep barns. Box-stalls in horse stables may also be permitted to accumulate manure, being kept well littered, and the result is better dryness, and no heating of the well-tramped manure, beside the total saving of all liquids.

Concrete blocks to set posts on are cheap and satisfactory. They are made right in place. Excavate to solid ground, usually 18″ will suffice, a hole 24″ square. Make wooden moulds shaped like truncated pyramids 8″ square at the top, 18″ at bottom or larger, depending on the size and weight of the building. These moulds may hinge together and fasten with bolts that may be loosened so that they may be easily removed from the blocks. It should be leveled so that the top comes to the right place, then filled with concrete in which may well be imbedded a good many cobble stones. A ¾″ pin projected upward from center of block and post set down on it 4″ is useful, if the building is not very heavy, to keep wagons from butting the posts off the stones. After a few hours of setting the mould may be taken carefully away and another block made. The moulds should be filled full enough to make them of the same level. A surveyor's level at hand when setting the blocks is most convenient and saves much time and trouble.

Hard earth is a very satisfactory floor for sheep barns and cattle barns where animals run loose. Earth is desirable for box stalls where they are kept littered, as they should be. Cement should be used for cow stalls and horse stalls.

Vertical siding is best. Matched siding is seldom dry enough so that the tongues stay in the grooves. It is better to use plain unmatched barn boards 12″ wide, battened with 3″ strips after seasoning. In any event put siding on vertically; it is stronger, more durable and cheaper to erect in this way. If you wish to whitewash the building either inside or out use unplaned lumber and the whitewash will adhere better.

Only the best shingles should be used. Cedar is said to be durable but the cedar shingles commonly sold are very thin. Steep roofs last double the time of flat roofs if of wood. Soaking wooden shingles for a moment in boiling linseed oil adds to their durability. A trifle of red color added to the oil adds to the beauty of the roof. The color should not be of sufficient quantity to more than stain. Dip the shingles in large handfuls to the tips, lay them on a piece of sheet iron and let them drain into the kettle. This is said to make inferior shingles last 40 years. They will not crack badly nor curl when so treated. Painting shingles is not recommended. Shingle nails as now made of steel wire will rust off in 10 years or less. They may be had galvanized and should be so for either shingles or slate.

There is no roofing more durable or more

satisfactory than slate. It is heavier than shingles and requires strong rafters. For barns single-lap slate is coming much into favor; it is lighter and much cheaper than double-lap and, save that storms sometimes blow in a very little, it is as good.

Perhaps no form of roofing has caused more disappointment and vexation than metal, which rusts rapidly and requires frequent paintings. Galvanized steel seems durable and when well galvanized it has endured for many years uninjured. Metal roofs are hot in summer.

Rubber, paper, felt and asphalt and other kinds of roofing will serve if given proper attention. Barn roofs are usually neglected.

For eave troughs modern tin rusts through in three seasons. Paint will not prevent rust in a tin eave trough. Galvanized iron is to be preferred. It is well to make eave troughs and spoutings of generous size.

"Let all hinges be larger than seems necessary" is the suggestion of an experienced barn builder. Hinges are cheap; get them strong. Make sliding doors to run on flexible hangers which permit the doors to be raised up at the bottom without twisting the hinges or track.

Stalls for dairy cows should be 3½′ wide; for beef cattle 4′ wide. Three single horse stalls will go in a 16′ bent. Four horses may easily occupy the same space in two double stalls and teams accustomed to standing together will do so without injury. Box-stalls should be of fairly generous size. For cows 7′ x 8′ is permissible as a minimum; for horses 8′ x 10′. Do not make many box-stalls so small. A good horse stall is 10′ x 12′. Horses will eat their hay from the ground in a box-stall without waste if not given too much, and many horsemen think it is the best way. Put windows in a stable as high as you can and put in plenty of them. Make doors 4′ wide where you can. Make as many of them to slide as you can. A height of 7′ in a cow stable is permissible if a good system of ventilation is provided. Make the horse stable 8′ or higher. Make the sheep barn as well ventilated as possible. A width of 12′ between centers of posts works well in the sheep barn. Do not try to put under one roof all classes of stock, tools, hens, and hired men. Do not plan immensely wide barns. They seem economical but greater comfort and better results come from narrower barns built partly to surround a paved court, sheltered thus from wind and storm.

WING'S JOIST FRAME

Joseph E. Wing thus describes the joist frame: I have for many years studied the question of barn frames and designed a good many types. A barn frame should have great strength to uphold weight, resist wind pressure and withstand the pressure of rafters when weighted with snow. My progress has been a steady evolution towards the simple frame of two stories or more, with curb roof and purlin posts, in which every stick has a purpose and is so placed that it exerts its utmost power in the line of its greatest strength. The frame is an arrangement, an adaptation, and I have not hesitated to adopt other men's ideas. The roof was invented many years ago and used in New York and New England. It has stood the test of 40 years or more in the heavy snows of that region, and I have never seen nor heard of one crushing. Built in the form of an arch it supports itself. The side walls need not be extremely high; from 18′ to 20′ with this roof gives great storage capacity. They are prevented from spreading by the long

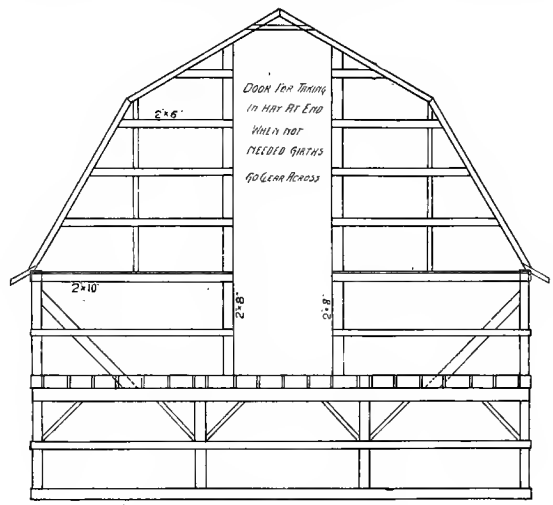


FIG. 2—WING'S JOIST FRAME.

brace which will withstand ten times the pull that the thrust of rafters may ever put over it. For very wide barns purlin posts should be used, but up to 50′ this roof is safe when rightly framed with the supplemental truss beneath the angle, and when so framed there is yet a saving in material and convenience over the old style roof supported by purlin posts. (See Figs. 2, 3 and 4.)

There is no solid timber at all in the frame and few sticks need be of unusual length. There should be full-length posts; aside from these ties, joist-bearers, plates, nail girts and all may be spliced wherever convenience indicates and by always placing a piece 2′ long behind the splice, and, spiking well, the whole is made as though of one piece. But one difficulty may confront the builder: the building of hay chutes. It is not desirable to have permanent hay chutes, for with

the mow unobstructed by cross-ties hay is taken in by sling carriers that grip the rope and hold the draft at any height, thus swinging it in as soon as it clears the level of the hay in the mow or the mow floor, and hay chutes are very often needed in the middle of the barn. To make this come right have the hay chutes made in sections of about 6′ high, building them 3½′ or 4′ square, and in this manner build two panels of solid boarding, like doors, say 3½′ x 6′, and hinge together at the edges so that they collapse and lie flat. Provide hooks on one edge and staples on the other. Take two of these pairs and opening them hook together and set over the opening in the floor and you have a section of 6′ of your hay chute. Fill the mow that high or a little higher and set up another section; thus till the mow is filled. When taking out hay these sections are folded up and hung on pegs in the side of the mow until needed again next season. This hay chute costs no more and is as easy to build as any. A light ladder may be fastened to one side of each section for entrance to the mow.

A great many of these frames have been erected, some in very windy and some in snowy locations, since the plan was first presented in THE BREEDER'S GAZETTE and not one has given trouble to erect or in use, so far as I have learned. Siding on this barn is better put on vertically. If matched siding is desired it works as well vertically as horizontally. The building may, however, be studded and siding put on horizontally.

In building the joist frame barn the following directions may be of value:

Get one carpenter to superintend the job; three or four men can find employment and the more men the shorter the job. Pile up joists six or eight high and square, mark and cut off with a small crosscut saw; pile each sort out by itself so you can get hold of it quickly and surely. Never make splices without breaking joints and use a block 2′ long at the splice. Spike together well at splices and everywhere. Use spikes 6″ long and drive in a plenty; they are cheap. Put bents together on the ground, though you may finish spiking together after raising, as spikes should be driven from each side. Raise the bents and brace up temporarily until you have two standing, then put on box plate, plumb very carefully, then put in long side braces and one or two pieces of nail girts. That will make the frame very rigid. You can now continue to raise the bents one at a time and continue putting on plates and braces as fast as they are raised.

It will take four men two days to frame a barn 40′ x 60′ and if convenient they should have four others to help raise, which will take another day. After the frame is up as far as the square, complete that part and put on the siding before erecting the rafters. A scaffold at the level of the plates is convenient, though some have erected the rafters without it. If you wish to change the proportions of timber used, do so, but

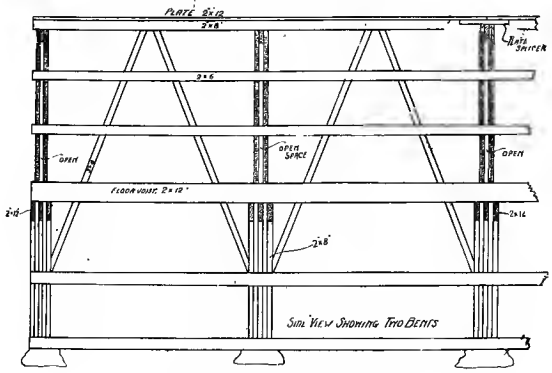


FIG. 3—WING'S JOIST FRAME.

make it heavier rather than lighter. A saving of $10 in material might make you many times that much trouble. The frame as it is saves a great amount of timber. Frame together the rafters and most thoroughly nail them together before raising. Discard any weak or uncertain sticks. Use good inch boards 5′ long. A trifle of expense

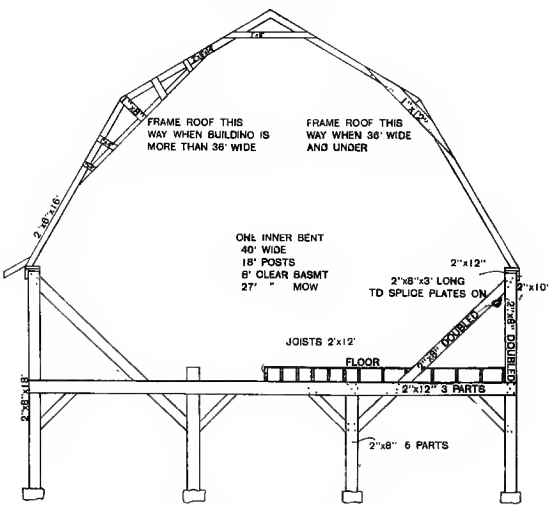


FIG. 4—WING'S JOIST FRAME.

here gives you a rigid roof. Tie together the rafters with 1″ x 4″ sheeting across all the angles before raising. Leave this sheeting on until you must have it for laying on the roof. Put two nails in sheeting instead of one at each intersection of rafter. Raise the first set of rafters at the gable and very carefully stay them

and spike the bases to the plates. Begin raising rafters in the morning so you can get them all safe before night. Select good 2″ x 6″ long stuff, run diagonal braces under the rafters from the corners of the building clear to the center of the roof, two spikes in each intersecting rafter. This will make the roof very rigid. Get these braces up as soon as three sets of rafters are raised. If hay is to be taken in at the end, throw out two sets of diverging rafters to hold the end of the track and shelter the hay door. Their feet may be spiked against the outer long rafters and their points thrown out, each pair 2′.

Brace the gable well. Hay doors should be 8′ to 12′ wide. They may be double and their upper ends fold down to admit of swinging under the roof. Turn these doors away from direction of wind. Vertical siding is strongest and best for this frame. Roof projection should be 2′ at gables and generous at eaves. It is best added at eaves by spiking on sides of rafters short pieces of 2″ x 4″, giving the same slope as the top part of the roof. Shingle this clear up. Do not attempt to bend the shingles. Use galvanized shingle nails. Do not leave out any braces. Put 2″ blocks on stones under end of posts. When they decay they can be replaced and no injury to posts result.

GENERAL FARM BARNS.

The farm barn built by W. H. Dunwoody on his farm in Minnesota is 120′ long, 90′ wide, 48′ high and cost complete $20,000. The basement floor is cemented throughout and on it there is a poultry house 10′ x 25′ with a glass front to south, nesting boxes, with inclines, roosts and runway to outside yard. There also is a storage room 12′ x 20′ in the west end of the basement, together with an old pump room and wash room 10′ x 25′; west stairway to main floor; three box-stalls 12′ x 17′ for dairy cattle; six stalls for dairy cows; five horse stalls and two box-stalls 8′ x 12′ for horses; two rows of box-stalls 9′ x 12′ (six stalls to the row) with alleys between; 12

FIG 5—A MINNESOTA FARM BARN (ELEVATION)

double tie-up stalls 5′ 8″ long, mangers 26″, width of stall 8′ 9″, each stall being equipped with iron enamel water bowl, with drop cover, piped to water supply; drain trenches behind or connected with all stalls, 18″ wide by 3½″ deep; large ventilating flues from basement to attic of barn; the height of the basement on north side of barn is 4′ above outside grade, giving large basement windows for admission of fresh air; hand extinguishers throughout barn and fire hose on reels, connected to attic tanks; root boiler room 10′ x 15′, containing large root cooker; masonry on all sides; steel roof; window for fuel; root

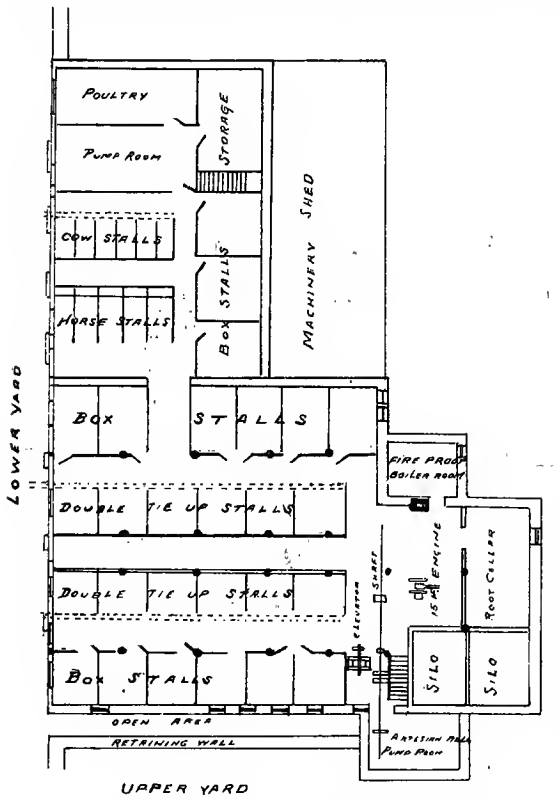


FIG. 6—MINNESOTA FARM BARN (GROUND FLOOR).

cellar 12′ x 24′, adjoining boiler room; two silos about 11′ x 14′ x 30′, cement plastered; engine room containing 15-horse power gasoline engine; about 50′ line shaft, with pulleys to grinder, conveyor, elevator, sheller and cutter on floor above, and also connecting pump in pump room, and to circular saw outside; east stairway to main floor; artesian well pump room off engine room. The passageways or alleys between rows of stalls all lead to doors on south side of barn opening into lower cattle yard, which is divided into east and west halves with sheds on farther side; yards slope to south. (See Fig. 5.)

The main or first floor is described thus: Machinery shed 18′ x 60′, containing farm machinery, also separate tool room and work shop. Driveway from east to west through barn 120′ long; flooring 3″ matched plank; 3′ on center floor timbers or joists under driveway, size 6″ x 12″; joists elsewhere same size but 6′ on centers; hay and straw bays on south side of driveway (hay carriers above the hay distributing floor, above part of the driveway—this floor is provided with trap doors and when bays are full this floor can be filled its full length); grain and feed bins on north side of driveway, connected to

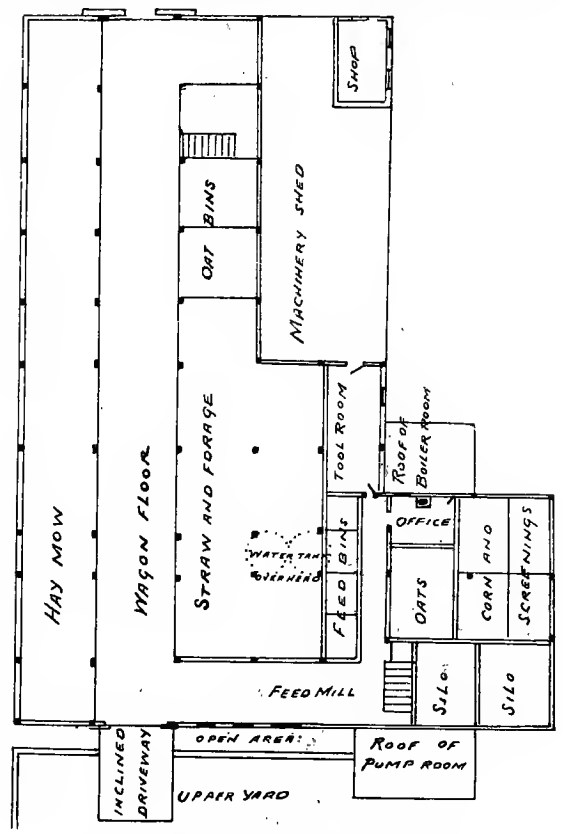


FIG. 7—MINNESOTA FARM BARN (SECOND FLOOR).

conveyor and elevator for handling the grain and feed; feed grinder, cutter, sheller, grain cleaner and elevator arranged next to bins on east end of floor and over engine room; office or men's room adjoining with heater, bed and wash-sink; stairway to second floor in east end. (See Fig. 6.)

The second floor is explained as follows: Men's room with heater and furnishings; large storage platform adjoining; stairs to top of silos, elevator head and water tanks. In the attic there are two water tanks holding about 350 gallons of water. The scale and scale platform are outside

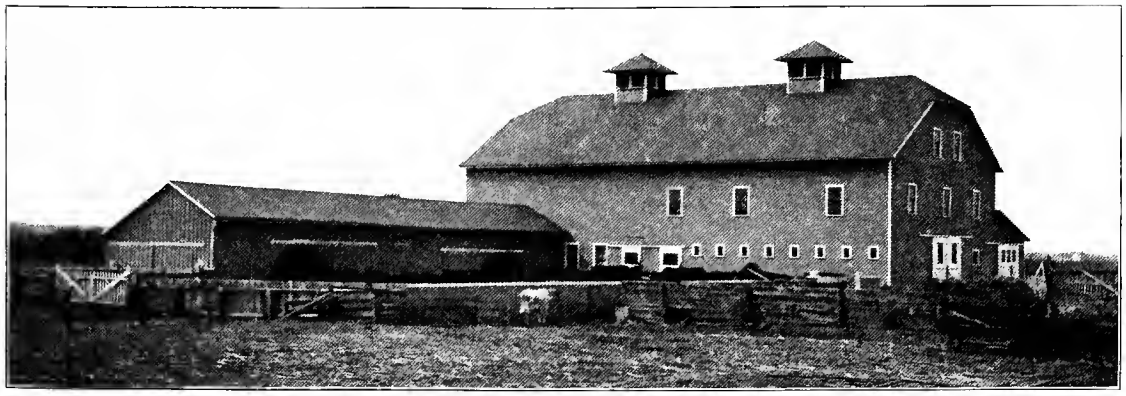


FIG. 8—LOVEJOY'S FARM BARN (ELEVATION)

of the barn on the driveway leading to the east end of the barn. (See Fig. 7.)

LOVEJOY'S FARM BARN.

The general-purpose barn shown in Figs. 8, 10 and 11 was designed by Mr. A. J. Lovejoy and built on his Riverside Farm in Winnebago Co., Ill., in 1903. It is for horses and cattle, together with machinery, wagons, manure spreader, carriages, buggies and sleighs. It also has bins for 5,000 bushels of small grain, mow room for hay, shredded fodder, a large amount of straw and large tank of water which supplies the barn and adjoining yards. It is 96′ x 64′ and is built in a first-class manner, having a joist frame made of the best grade of hemlock lumber, with Wisconsin white pine siding and 2″ x 6″ studding, on which rosin paper is used and the whole sheathed with best kiln-dried dressed yellow pine, making an interior finish equal to many houses. The foundation is made of concrete, from screened gravel and Portland cement. Every post in the building rests on solid concrete piers set in the ground 3′, on a 4′ base. The entire floor is of concrete, 8″ thick on a gravel fill of 15″, and was made with a good finish by an expert builder of concrete sidewalks. The approaches to each door are also concrete and a concrete sidewalk extends along the south side of the building to the door of the engine room. The inside is divided into suitable rooms, as shown in the plan. The engine room is closed so as to exclude dust or dirt from the mill room. A 12-horse power gasoline engine furnishes power enough to run the grinder, feed cutter, sheller, elevator and pump all at the same time. There is a 28′ elevator with a swinging extension that stands at the side of the driveway and swings behind a wagon while standing on scales. This elevator will elevate all kinds of grain to the large bins above. These bins have hopper bottoms with pipes leading to the mill room below, direct to the grinder, fanning mill and for loading wagons. The barn is lighted by acetylene gas furnished from a plant which also lights the residence and farm office.

The barn was made for convenience in handling feed and preparing it for best results. No hogs are kept in the barn, but all feed is prepared in it except the steaming, which is done at the feed house. All wagons are driven in the barn and all hitching and unhitching done in it. The total cost without any of the machinery, engine and the "L" was about $5,000, which includes painting. The 26′ x 100′ "L" was

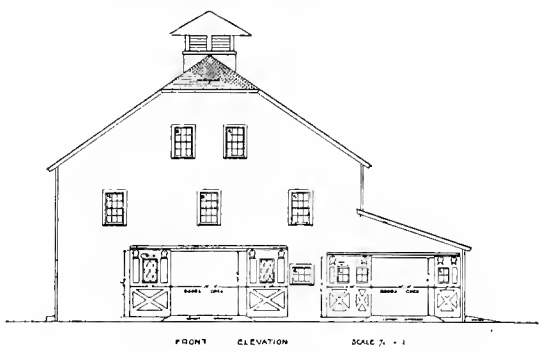


FIG. 9—LOVEJOY'S FARM BARN (FRONT ELEVATION).

joined to the barn for a cattle shed and has arched openings that can be closed by roller doors.

Where the diagram is marked "platform grain dump" a set of scales was put in and an elevator installed to carry grain to the granary upstairs. The six large hopper-bottom grain bins are on the second floor. (Fig. 11.) The bay for hay, indicated in the illustration, was changed and floored with cement, the same as all the rest of the barn. The elevator does not require a dump, as the hopper swings round behind the wagon and grain is let out into it from the rear end of the wagon. Plank floor is laid in the horse stalls

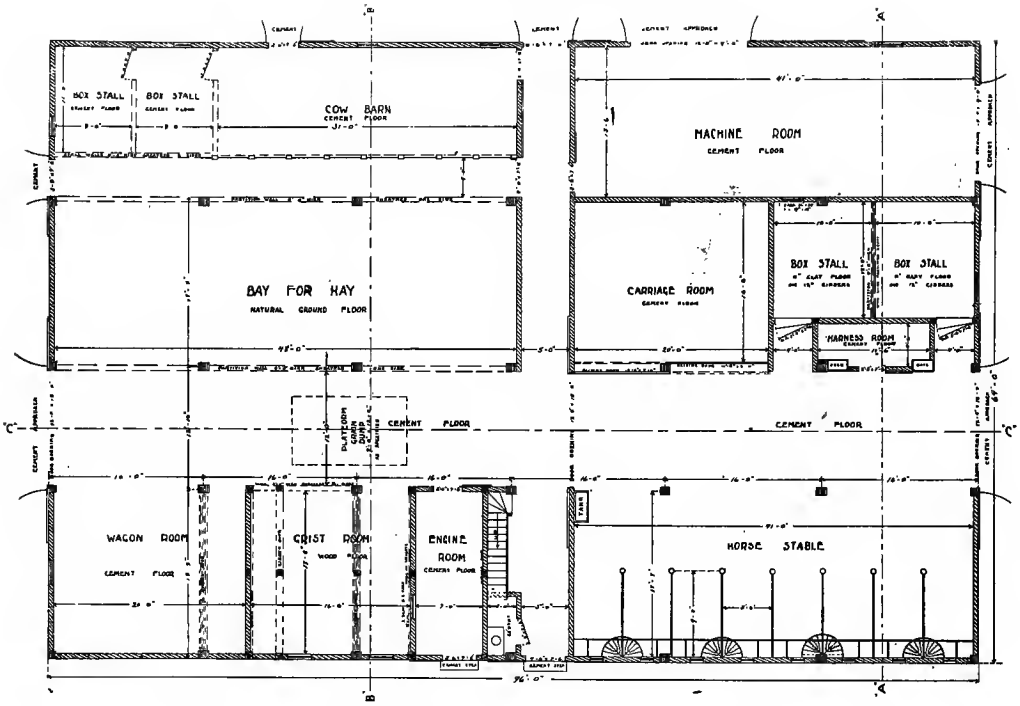
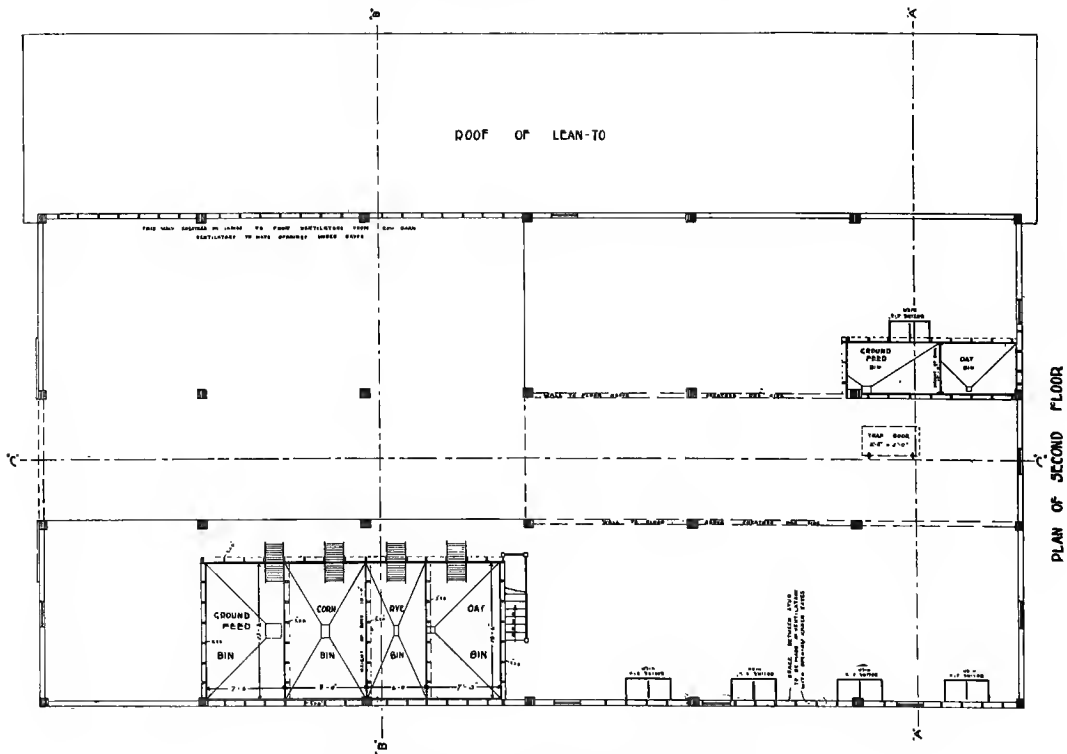


FIG. 10—LOVEJOY'S FARM BARN (GROUND PLAN).



PLAN OF SECOND FLOOR

FIG. 11—LOVEJOY'S FARM BARN (SECOND FLOOR).

on the cement, as it was thought that horses would be less liable to slip. A drilled well is in the stable with a 100-barrel tank above in the second story. A system of water works from the elevated tank in the barn furnishes a good supply of water in the barn and out in the yards.

A better system of ventilation is used than the one shown. All posts in the first story are boxed, giving a finished appearance. The barn is almost frost-proof and is very convenient and a comfort to stock housed in it. The front elevation is shown in Fig. 9. A photographic view of the barn is presented in Fig. 8.

NEW TYPE OF CIRCULAR BARN.

The illustrations (Figs. 12 and 13) show a circular barn designed by Architect Benton Steele of Indiana and erected on a farm in that State.

FIG. 12—NEW TYPE OF CIRCULAR BARN (ELEVATION).

The barn is 102′ in diameter. The system of construction might be termed balloon framing, as no heavy timbers are employed in the barn proper. The system of framing is usually spoken of as the bending system on account of the fact that many of the important features of construction are obtained by bending the timbers into the required shape instead of sawing.

This barn is designed to accommodate all the feed and stock that can be produced on a farm of about 250 acres and yet allow for growth and improvement for years to come. In this, ample allowance is made for storing away implements and machinery and for a battery of feed mills and grinders, together with water tanks and plenty of working space in every department. The floor space shows stalls for cows. The departments marked 1, 2, 3 and 4 (Fig. 13) can be used separately or in part, or if need be can be thrown into one continuous department as occasions demand, such as when hauling out manure or in feeding numbers of stock together. The double gates as shown are made and hung in such a manner as to be easily removed, and the walls are provided with a number of sets of "eyes" so that the gates can be hung so as to provide any size space desired. Every department is directly accessible to the outside doors, which is a great convenience in shifting stock from place to place or in case of fire. The stock is all fed the main rations from the one continuous feed alley, the feed being passed through chutes or trap doors in the second floor. When roughage is fed to loose stock it is passed through chutes at the outer sides of the barn next to the wall into racks as shown, which operate on the plan of self-feeders.

The bins or cribs below are filled by gravity from above. Portable corn bins may be used in the second floor when needed. A solid concrete wall is placed under the barn as well as the inner rows where supporting timbers rest, and special precautions were observed so as to exclude rats entirely from ever finding a burrowing place.

The windmill is a power mill with a wheel

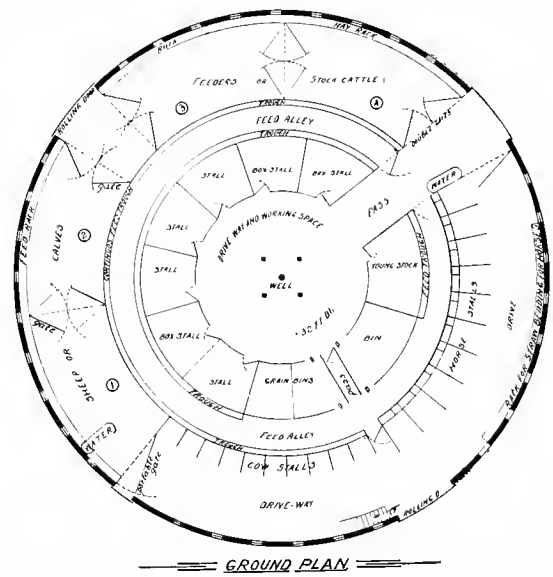


FIG. 13—NEW TYPE OF CIRCULAR BARN (GROUND PLAN).

16′ in diameter, and rests on a crib or tower in the center of the barn. Several flights of stairs are provided which furnish a means of access to the cupola where one can look after the workings of the windmill, or get a view of the surrounding country for many miles. The windmill supplies power for running machinery and pumping water, and being placed at such an altitude renders it very sensitive to the slightest breeze.

The second floor is entirely free from obstruc-

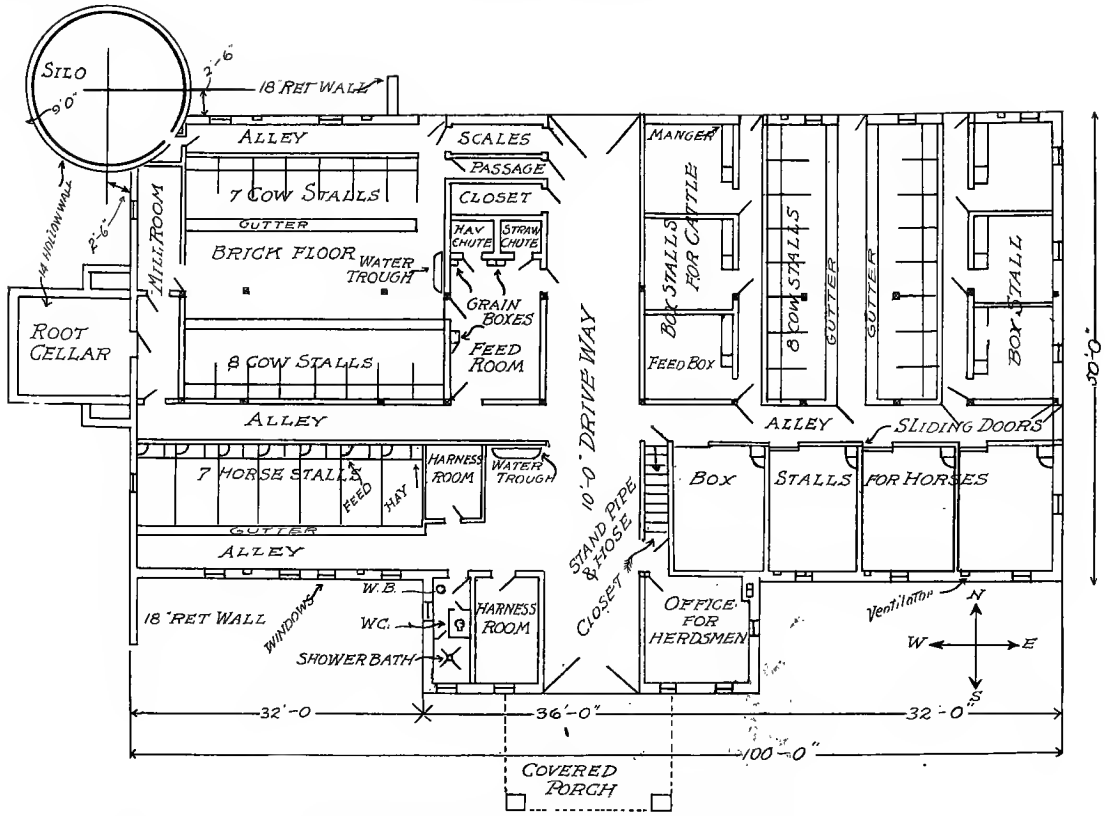


FIG. 14—AN EXPERIMENT STATION BARN (GROUND PLAN)

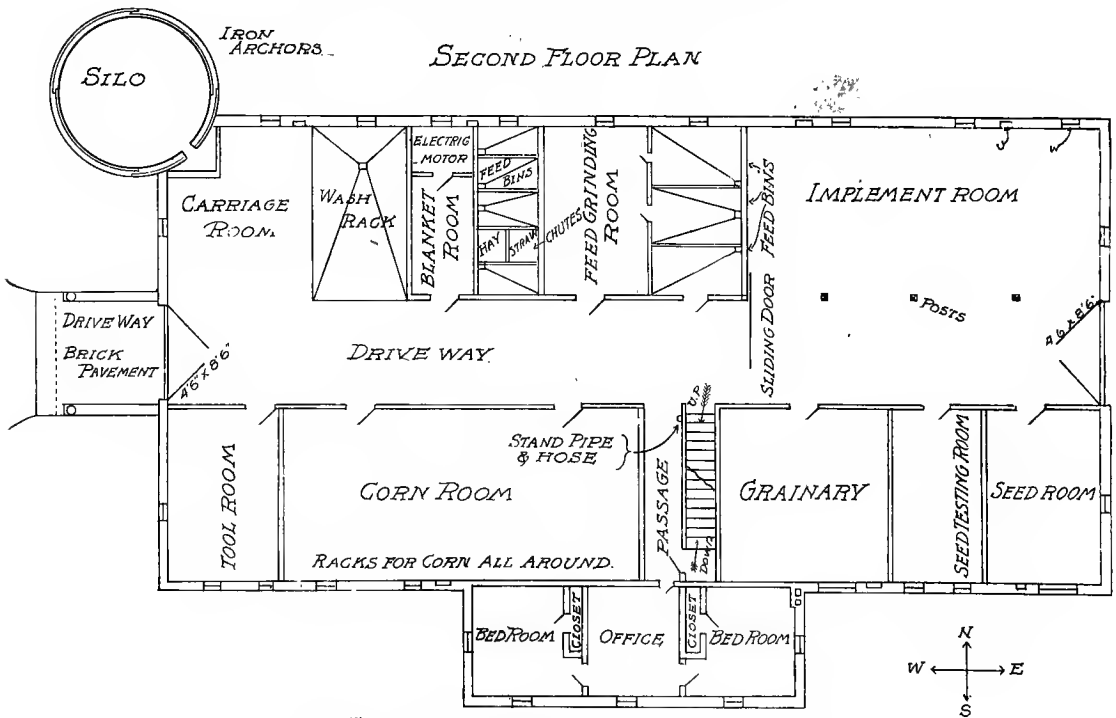


FIG. 15—AN EXPERIMENT STATION BARN (SECOND FLOOR).

tions with the exception of the crib and mills, as before mentioned. The roof is entirely self-supporting, no trusses being employed, nothing heavier than 2″ x 6″ rafters. The mow floor has an estimated hay capacity of 350 to 400 tons. The haying outfit consists of a circular track suspended about midway up the span of the roof and operates an ordinary swivel car or carrier, in other ways much the same as in ordinary rectangular barns with straight-away track.

AN EXPERIMENT STATION BARN.

The Iowa Experiment Station barn at Ames is a very modern affair, roomy and well arranged. It is a brick veneer, three stories high, 50′ x 100′. The first or ground floor is for stock, the second for grain, implements, carriages and the like, while the third is the hay mow. The silo is of brick, has a 4″ dead air space in the wall and is 18′ in diameter by 28′ deep, giving a capacity of 70 tons. The root cellar, which is under the driveway, also has a hollow wall. In the horse stalls a 3″ false floor, with wide cracks to allow urine to drain away quickly, is laid over the cement, which is the flooring of the cattle stalls, all passages being brick-paved. Over those parts marked A, which are ceiled up 3′, there is a wire network 24″ high. That in front of the horse stalls is hinged so that all the feeding may be done from the alley. The box-stalls for horses are sided up 5′ with 2″ stuff and iron rods run the rest of the way to the ceiling. (See Figs. 14 and 15.)

In the feed-room the hay and straw are brought from the third floor in chutes with doors at the bottom. The grain is also brought down in small chutes with cut-offs, so that all the mixing of feeds may be done on the first floor. A hot water stove in the herdsman's office heats the bathroom and the teamsters' rooms above on the second floor and also the seed-corn room. The 18″ retaining walls on the southwest corner and north side show the difference in the elevation, the ground on the west being higher than that on the east of these walls. On the second floor are the bedrooms and office of attendants. In the corn-room there are racks all around so the seed corn can be ricked or corded up in them, giving better ventilation and economizing space.

The driveway is covered and is roughly paved to give horses a foothold in drawing loads over it. A continuous chute from top of silo permits silage to be thrown from either of the three doors to the feeding floor. The motor-room just off the blanket-room is for a 15-horse power electric motor. A line shaft from here into the feed grinding room allows for belting to feed cutters and other machinery. All the feed-bins have sloping bottoms to facilitate the passage of grain through the chutes to the mixing-room. Ventilator courses from the ground floor to the outlets on top give ample ventilation. A stand pipe and fire hose on reels afford partial protection from fire within, while larger hydrants outside have been placed near the building.

A STOCK AND HAY BARN.

The illustrations (Figs. 16, 17 and 18) are of one of the most commodious and best arranged stock and hay barns in the West. The building in the main stands 132′ east and west by 112′ north and south and the wings are 32′ wide. The details of the basement are very fully shown (Fig. 18) and the conveniences of such an arrangement are obvious. In the basement and immediately under the wagon floor there are located three bins for grain or ground feed and roots. They are filled through trap-doors from above, the sheller, or grinder, or root-cutter, or corn-crusher being placed over the traps and the power

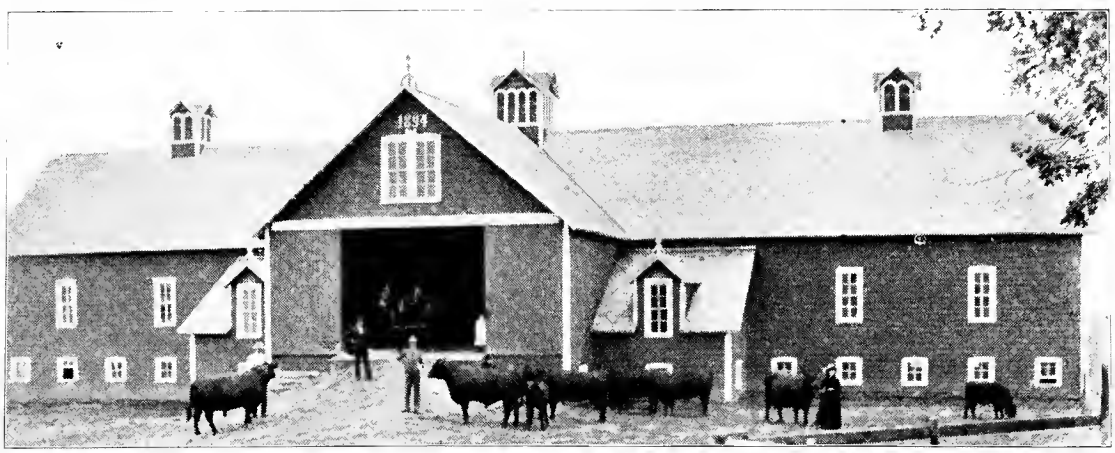


FIG 16—A STOCK AND HAY BARN (FRONT ELEVATION).

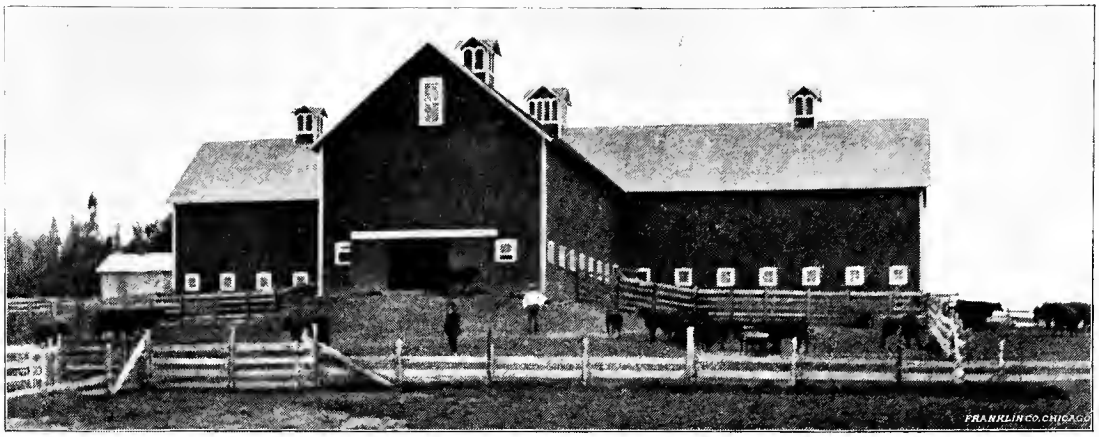


FIG. 17—A STOCK AND HAY BARN (REAR ELEVATION).

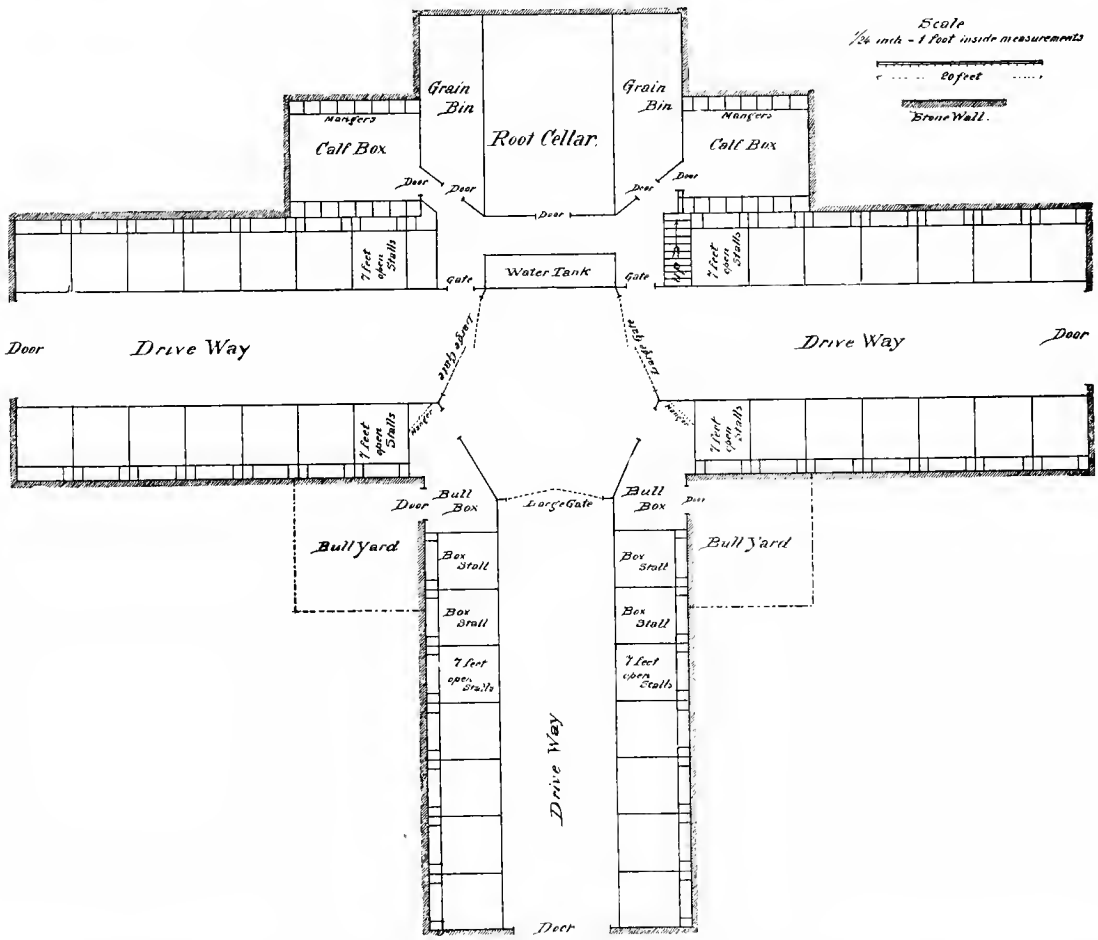


FIG. 18—A STOCK AND HAY BARN (BASEMENT PLAN).

furnished by the belt from the three-horse tread power shown in the ground plan of second floor. Immediately adjoining the feed-rooms are two calf boxes that will conveniently accommodate about twenty youngsters each, and the balance of the floor is devoted to double stalls 7′ deep,

except as otherwise indicated on the diagram. The water tank is in the center of the barn and large gates expedite the handling of the cattle back and forth from the tank to the stalls, or to the yards if they are turned out. There are good-sized box-stalls for the service bulls, with

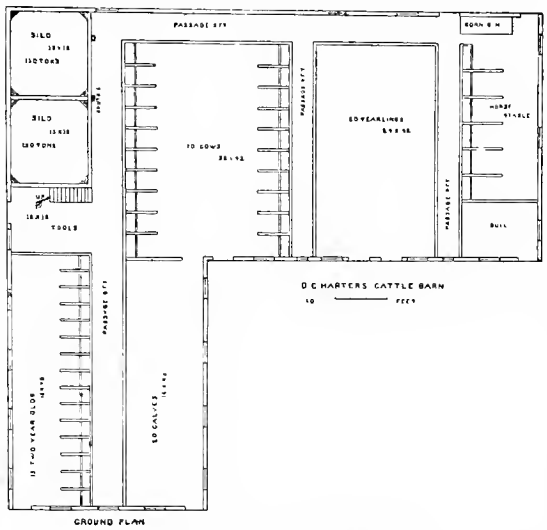


FIG. 19—AN INDIANA FARM BARN.

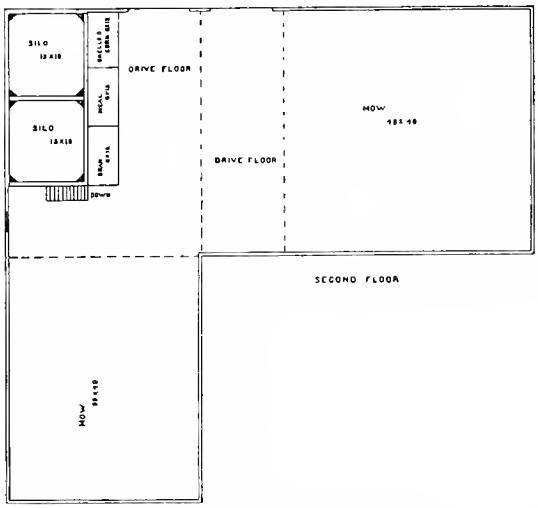


FIG. 20—AN INDIANA FARM BARN.

direction and the manure loaded onto a wagon or spreader and carted to the fields. This basement is surrounded by a stone wall and is very warm, though amply lighted and ventilated by numerous windows and doors. The water is piped underground to the trough from well and windmill outside and is controlled by a float-valve or by a cut-off rod, as desired.

an exercising yard opening out from each, and in the south wing there are four box-stalls for cows calving in cold weather or for any other use desired. The driveways are 12′ wide, so that a team can be driven through the barn from either

On the second or main floor there are grain bins and corn cribs, 8′ x 24′ and 14′ high, and office and store-room, each 14′ x 16′; a space

FIG. 23a—CATTLE AND HORSE BARN AT WHITEHALL (FRONT ELEVATION).

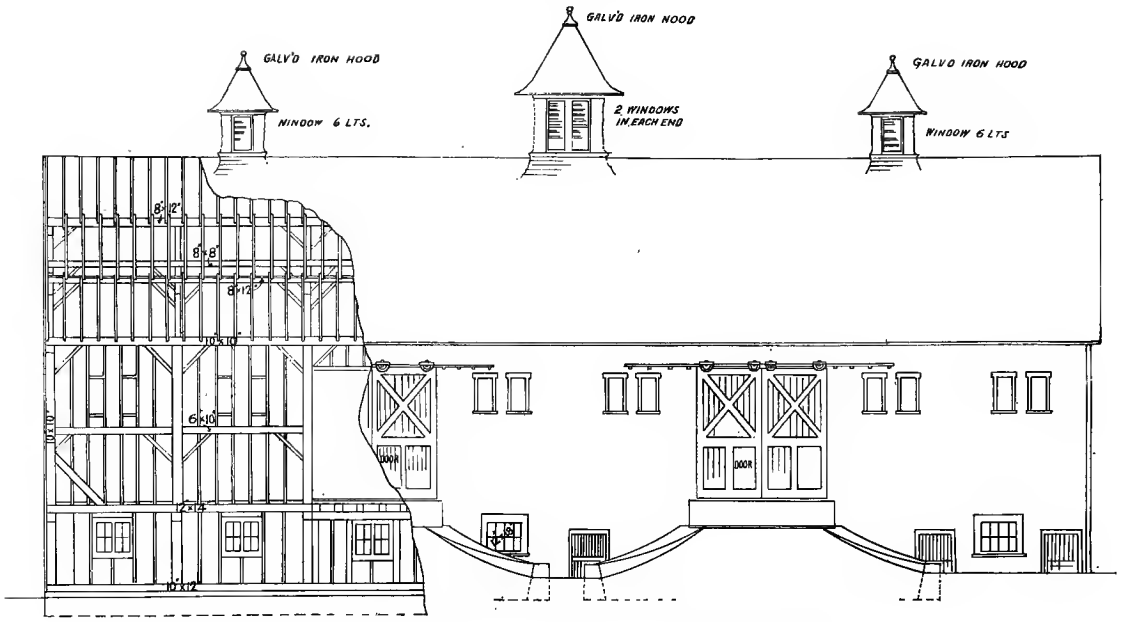


FIG. 20b—CATTLE AND HORSE BARN AT WHITEHALL (CONSTRUCTION).

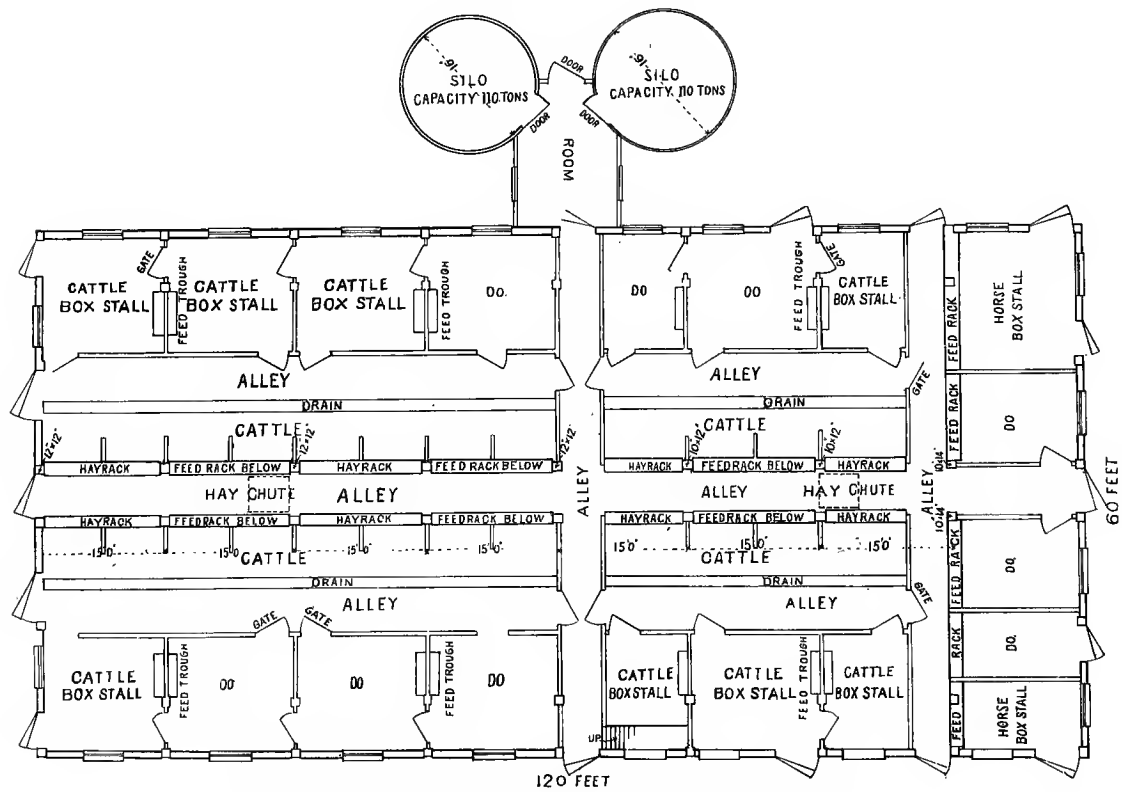


FIG. 20c—CATTLE AND HORSE BARN AT WHITEHALL (GROUND FLOOR).

reserved for feed-cutter and for hay-rake and hay-loader and yet additional room in the three mows for 200 tons of hay. The capacity for grain, including both floors, is from 7,000 to 8,000 bushels. The barn will accommodate 125 head of cattle, including from 25 to 30 calves. The building is very substantially constructed and with due regard to general symmetry and effect. As it stands it is a very attractive building, well painted and trimmed and cost about $4,000.

AN INDIANA FARM BARN.

Fig. 19 shows the ground plan of a barn in which cattle and calves may be fed, 20 cows kept (in Van Norman stalls) and "baby beef" produced. It is also provided with stalls for horses. The diagram shows how the ground floor is divided. Fig. 20 shows the arrangement of the second floor. This barn has a cement floor throughout and is conveniently arranged for the uses to which it is put. Two silos are shown in one corner, and the corn silage stored in them is very successfully used in the making of "baby beef."

CATTLE AND HORSE BARN AT WHITEHALL.

Figs. 20a, 20b, 20c, 20d and 20e show the elevation, floor and other plans of the beef cattle and horse barn which E. S. Kelly recently built on his Whitehall farm in Ohio. Fig. 20c shows the ground floor on which there are stalls for cattle and horses. All the stone work is of good native limestone, laid up in good lime and sand mortar. The retaining walls around the drives have half cement and half lime in the mortar. All the bill stuff and dimension lumber in the basement are of sound native whiteoak. The 8″ x 12″ beams in the drives on the outside are also of whiteoak. All bill stuff and timbers above the basement are first quality longleaf Southern pine; 6″ x 10″ middle tie beams are set back 4″ from face of posts to allow studding, which is 2″ x 4″, to pass without cutting. The floor of two outside drives is made of 2″ x 12″ oak alternating with 2″ x 3″ oak pieces set on edge, all laid on 8″ x 12″ whiteoak stringers. The entire first floor is floored with 1½″ dressed and matched yellow pine flooring and the driveways on the first floor have an upper floor of 1″ dressed and matched oak. The entire basement is ceiled all around the stalls, passages and alleyways 4′ high with 1″ dressed and matched yellow pine. The stable doors are built in two pieces, upper half 3′ and the lower half 4′ hi h.

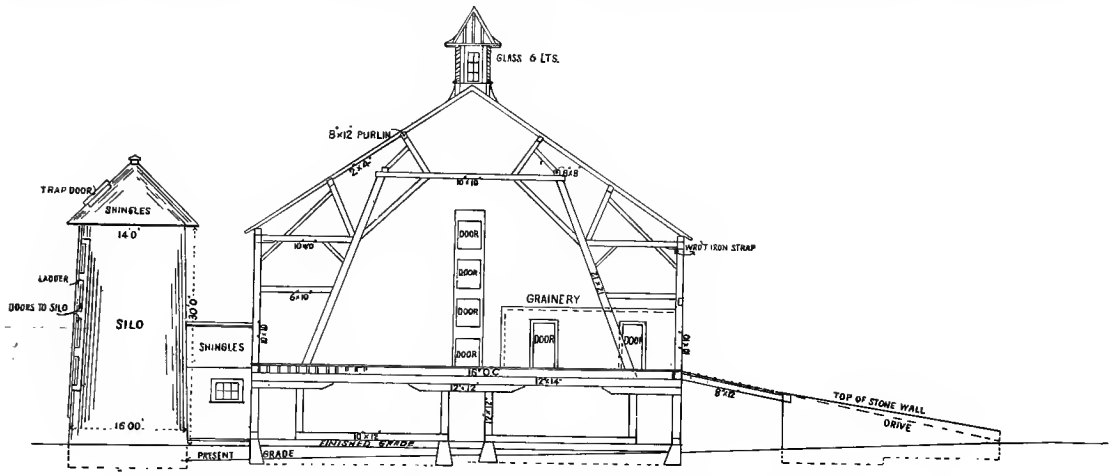


FIG. 20d—CATTLE AND HORSE BARN AT WHITEHALL (END ELEVATION).

The roof of the Whitehall barn and ventilators are covered with the best quality 16″ cedar or cypress shingles. The entire barn is framed to secure the greatest strength and permanency of shape with the least weakening of timbers. The windows in the basement are arranged to slide sideways, as directed. The entire outside of the barn is covered with 4″ drop siding. The cattle floors are made of cement. The barn cost about $7,000.

A WISCONSIN FARM BARN.

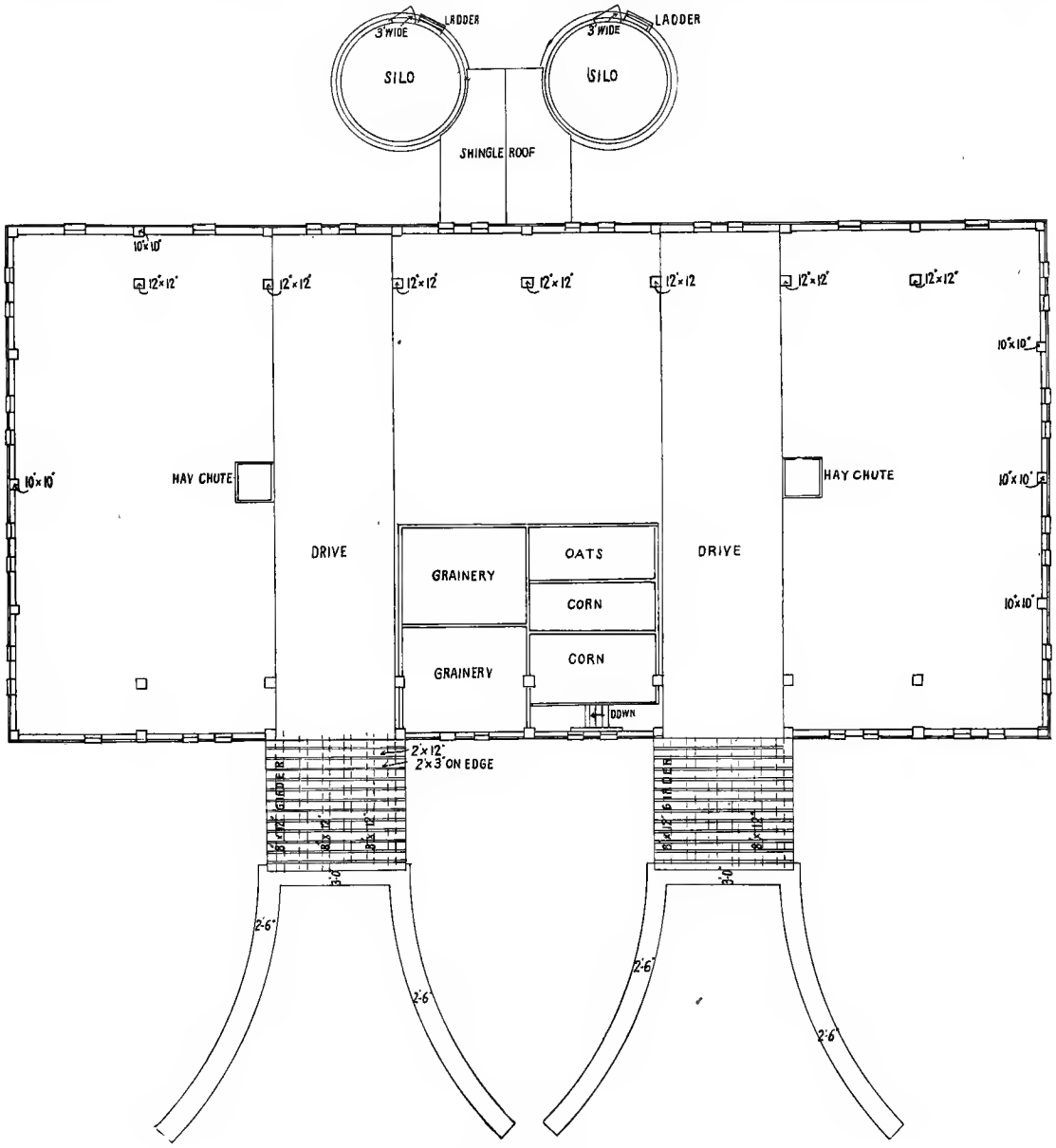
J. W. Martin's Wisconsin barn shown in Figs. 21, 22 and 23 has a stone wall foundation 20″ high; the first story 8′ is double-boarded with paper between and shiplap floor above. Fig. 22 shows the arrangement of the interior and Fig. 23 the plan of construction. The approaches to the main driveway and end doors are paved with cement. Box-stalls occupy the entire first floor

of the barn, and one stall is cemented for a restless bull.

The cow barn (Fig. 21) is 30′ x 80′ with Bidwell stalls and a driveway between the rows of cow stalls on through the middle. This barn would be more convenient if it were 34′ wide.

A KENTUCKY FARM BARN.

The general description and plan (Figs. 24, 25 and 26) herewith given are of a Kentucky barn built a decade ago. It is a bank barn and stands on high ground where natural drainage is good. The size is 62′ x 74′, and from basement floor to the wind-engine tower the height is 56′, divided into four stories. The basement wall is of limestone, 22″ wide and 8′ high, and the posts in the basement supporting the frame work are twenty in number and are of oak, 12″ x 12″. The parts of the frame are 10″ x 10″, 16′ high. The entire framework is of oak, the shingles of poplar



FIRST FLOOR PLAN

FIG. 20e—CATTLE AND HORSE BARN AT WHITEHALL.

and the siding of Northern pine. There were used in the structure 100,000 feet of lumber and 50,000 shingles, and the total cost was about

FIG. 21—A WISCONSIN FARM BARN (ELEVATION).

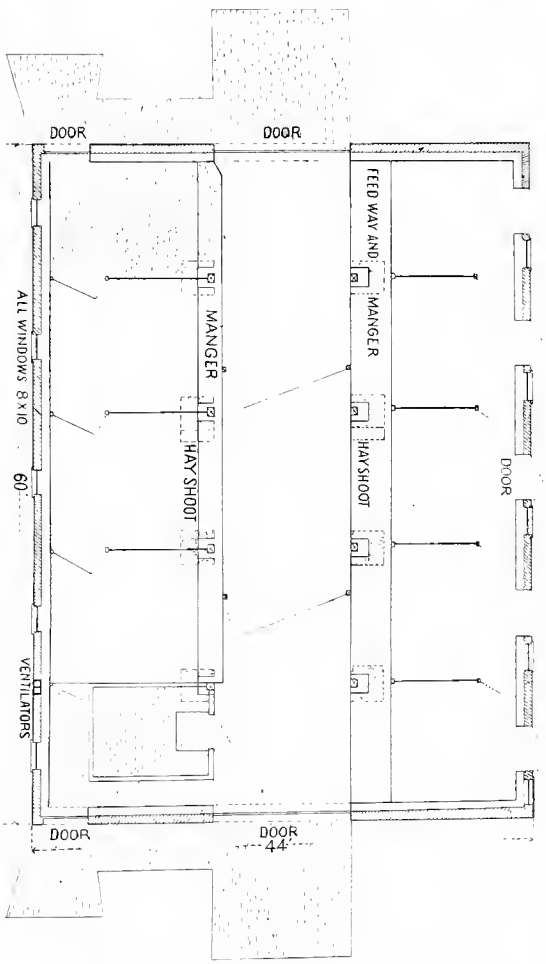


FIG. 22—A WISCONSIN FARM BARN (GROUND PLAN)

$3,900. The diagrams of basement and main floor (Figs. 25 and 26) are quite complete and need but little explanation. There are two feed aisles, with a cross aisle and forty box-stalls for grown animals, and the cross or calf aisle will accommodate fifty calves. The feed descends through a chute from the third story and two cars await to carry it

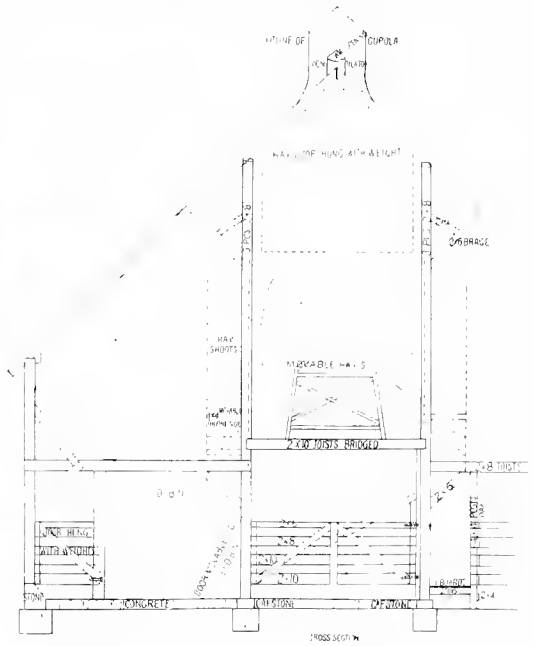


FIG. 23—A WISCONSIN FARM BARN (PLAN OF CONSTRUCTION).

down the aisles, along which it is distributed to the stalls. The columns in the second story, which extend upward and also form the third story, are 36 in number and 10″ x 10″ in size.

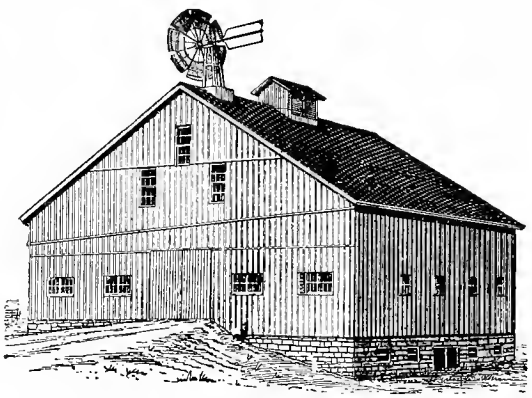


FIG. 24—A KENTUCKY FARM BARN (ELEVATION).

The floor of this story is double, with pitched felt between, which protects the animals below from the ones above. This floor is inclined each way from the center sufficiently to cause proper drainage. The entrance to this story is through double doors, 14′ high (Fig. 24), via an elevated

macadamized drive extending outward from each. Scales are placed at one door, so that the grain is weighed by the wagon load as it is taken from the barn. The wagon passes along the aisle and out at the opposite door. A gigantic hay-lift reaches down from above, takes up a load of hay and puts it in any desired part of the third and

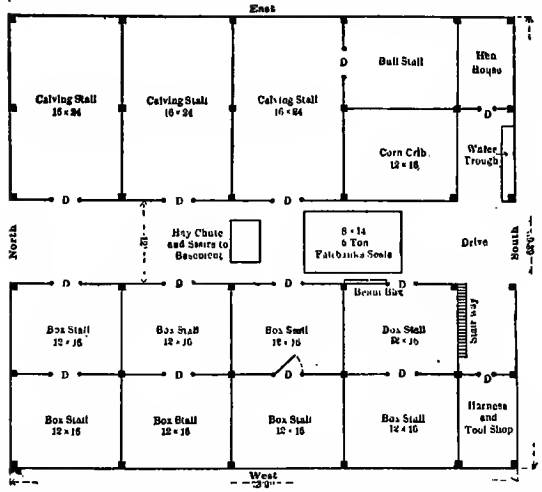


FIG. 25—A KENTUCKY FARM BARN (MAIN FLOOR PLAN).

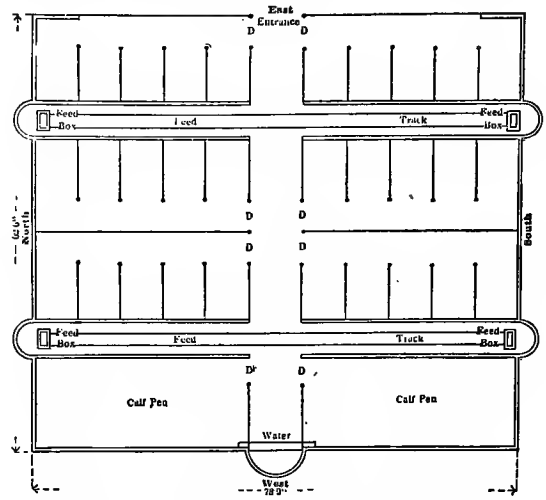
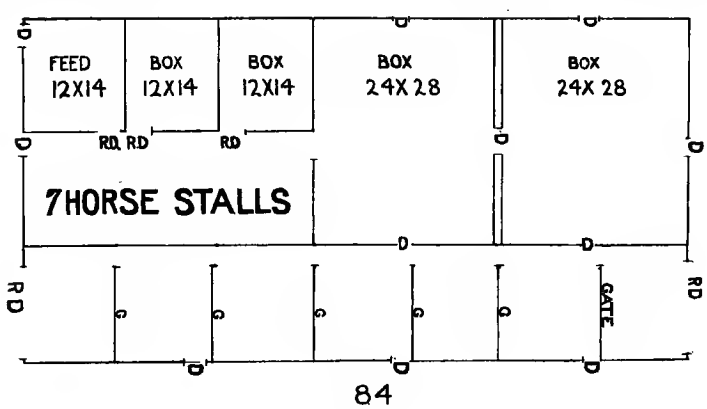


FIG. 26—A KENTUCKY FARM BARN (BASEMENT PLAN).



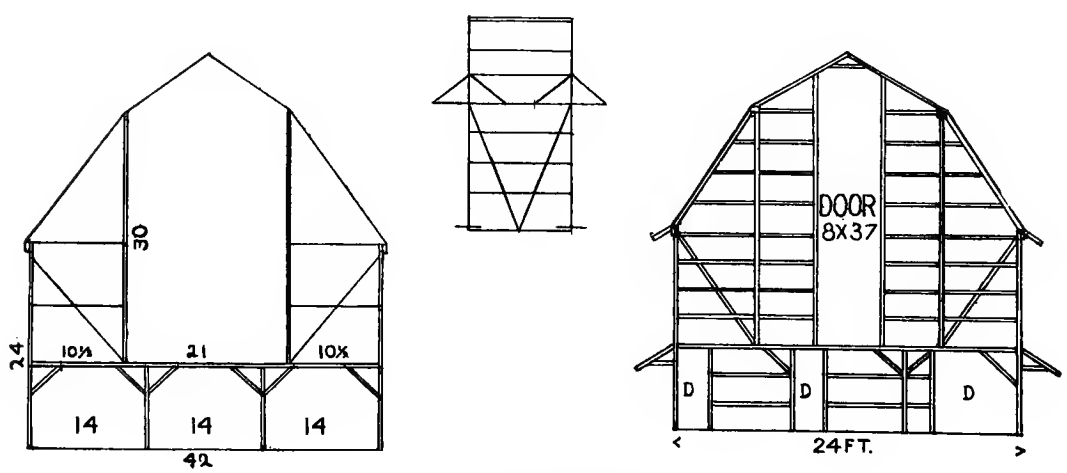


FIG. 27—AN OHIO FARM BARN.

fourth stories or hay loft, which loft has a capacity of 500 bales. The second story has fourteen calving stalls, as shown in diagram, which are so arranged that they can readily be converted in case of necessity into four stalls each, making room for 56 cows. In the center or main aisle, 12′ wide, there is room for 50 calves.

This gives the barn a capacity of 196 animals, all sizes. There also is an office on the second

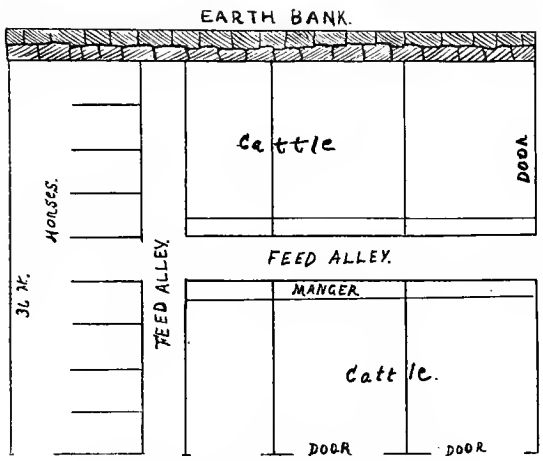


FIG. 28—A BANK BARN (GROUND PLAN).

floor. Just outside the building a cistern which holds 500 barrels furnishes the water for the entire building through a system of pipes. The third story contains the bran bin, corn boxes and cut-feed room, also the large cutting-box, the corn sheller and the pumping machinery, which are driven by wind power. So complete is the arrangement in every particular that one good man can easily feed, water and care for the stock and keep the barn in order.

AN OHIO FARM BARN.

The Ohio farm barn shown in Fig. 27 is 42′ x 84′, 24′ to square, with curb roof and purlin posts. The rafters are 20′ and 12′, cut so each covers one-fourth the width of the building; all frame is of plank sided with drop siding, put on up and down. The barn is built on a stone foundation and is covered with slate, single lap on steep deck and double lap on upper deck. The hay door is 8′ wide from the mow floor to the comb; hood 4′ wide on each side. The lower story is 8′ in the clear, mow 14′ to square, 30′ to purlin plates. The plank frame is a great improvement, certainly in cheapness and strength.

A BANK BARN.

In many locations bank barns may be cheaply constructed. The plan submitted is for a bank barn that will hold twenty-five tons of hay, have room in the basement for eight horses and about twenty head of cattle, with room above for about 1,000 bushels of corn and 800 bushels of small grain. In addition space is allotted on this floor for implements, wagon and buggy.

The basement plan is merely meant to be suggestive. Cattle may be turned loose, as sheep would be. The feed alleys should be formed by the mangers, these to be movable so that they can be taken out for cleaning. Fig 29 (first floor) shows a driveway, two cornerbs and an oats and wheat bin. These could be decked over aud hay put above except the part under the driveway directly under the comb of the roof. Hay is to be thrown down in chutes about 3½′ square, reaching to the feed alleys, and a hole may be left open in the driveway covered by a trap-door. If this barn was built of joist frame and most of the framing stuff secured on the farm and if the farmer himself is at all dexterous in the use of a saw and hammer the cost may be within $400. The size of the ground plan is 36′ x 48′ (Fig. 28).

A BASEMENT BARN AND CARRIAGE HOUSE.

The barn and carriage house shown in Figs. 30, 31 and 32 will accommodate three horses and three cows. The second story is used for hay and is 24′ x 30′, with a height of about 10′. The basement is 8′ in the clear, 24′ x 30′, has two windows on the north and two on the south,

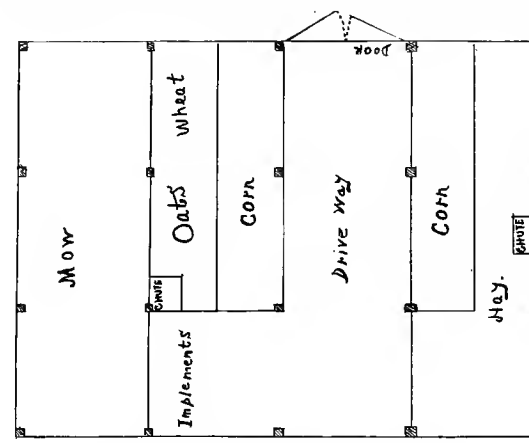


FIG. 29—A BANK BARN (FIRST FLOOR PLAN).

hinged at the top and when opened swing upward and are caught by a wooden latch. On the east there is a window 2′ x 3′, lighting the feed-room between the horses and cows. The wall is range-work stone on three sides and the east side is framed and weather-boarded. The entire floor is paved with boulders and tile-drained under the walls, so the basement is dry, well lighted, cool in summer and warm in winter. The ventilation

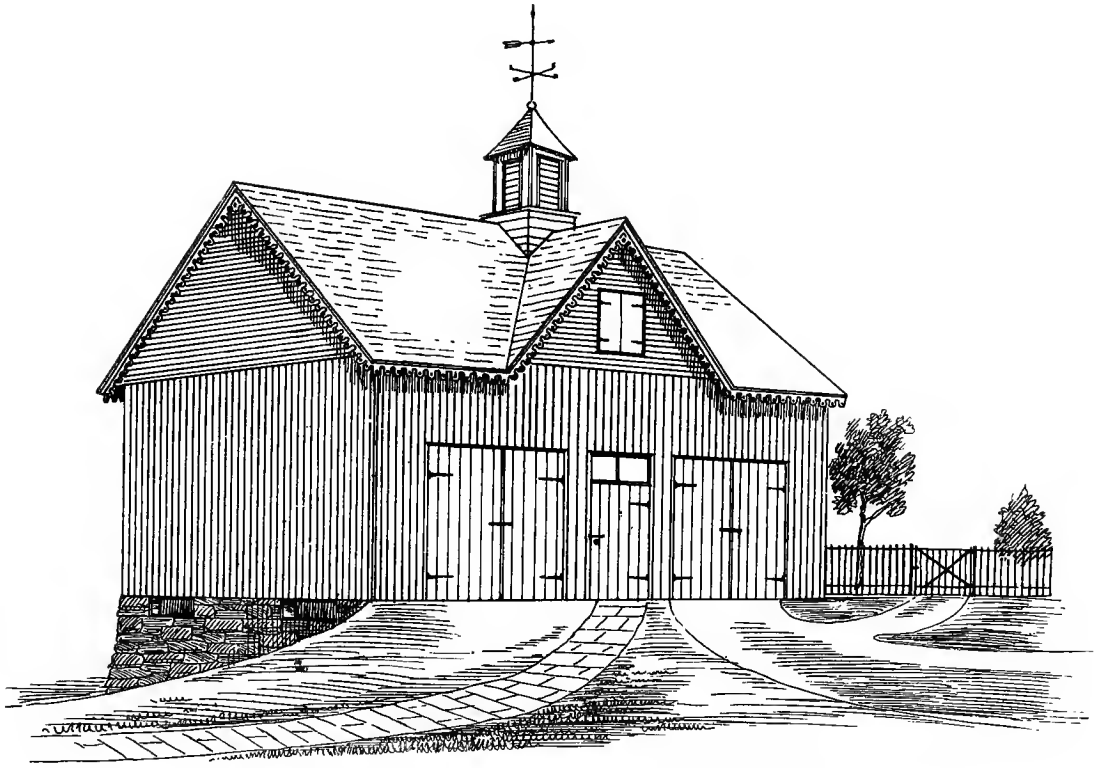


FIG. 30—A BASEMENT BARN AND CARRIAGE HOUSE (ELEVATION)

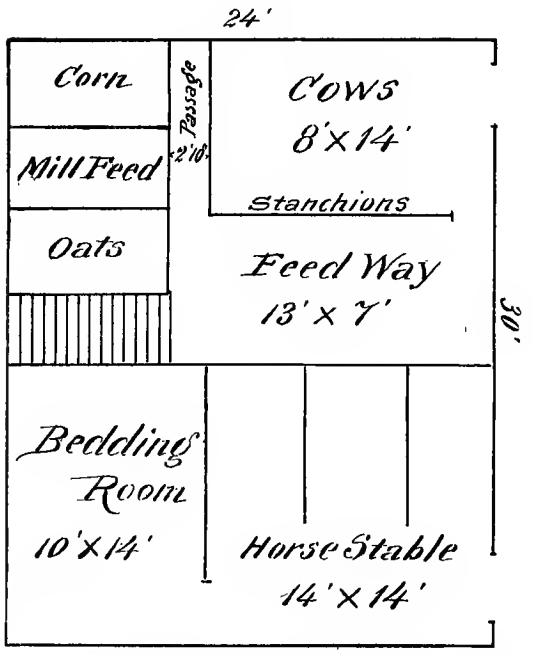


FIG. 31—A BASEMENT BARN AND CARRIAGE HOUSE (BASEMENT PLAN).

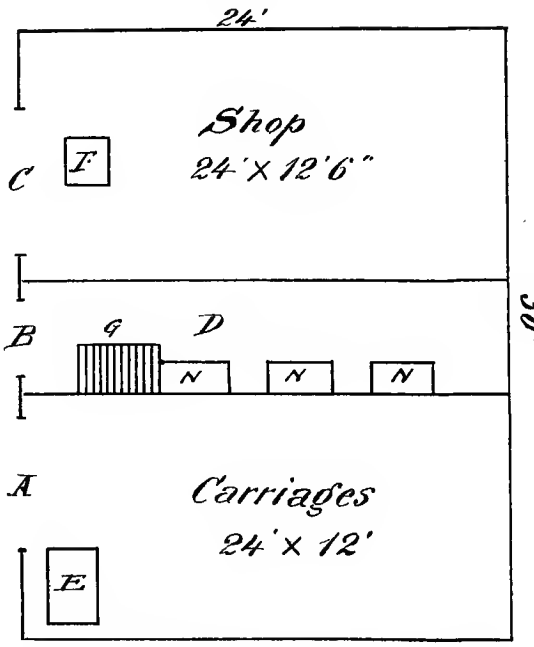


FIG. 32—A BASEMENT BARN AND CARRIAGE HOUSE (MAIN FLOOR PLAN)

is complete by opening windows on three sides in warm weather and the transom over the entrance at head of stairway. In the winter warm air passes up a ventilating shaft to the ventilator on top of the roof. The granary is set up from the floor one foot and out from walls a foot, so it is dry and rat-proof. It and the bedding-room occupy the back part of the basement, leaving the front part nearest the light and sunshine for the horse and cow stalls. The horse stalls are 4′ 6″ x 12′. The partitions of 1″ oak are set into the posts, so there are no nails or bolts to injure horses.

The hay racks are perpendicular, with rounds 3′ long set 4″ apart. The back of the racks is boarded tight, sloping, leaving a space of 6″ for hay at the bottom and 18″ at the top, being filled from the trap-doors in the hallway on first floor. The stall on the east side is 1′ wider than the other two to make more room for passing from the feed way into the stable. The bedding-room opens into the stable behind the horses and is filled from trap-door at the right of carriage entrance on first floor. The granary is divided for corn, oats and mill feed and a drop door at the bottom of each, so feed is removed and the doors always closed to keep out rats.

The cow stable is fitted with stanchions and a drop 6″ deep and 4′ 6″ back. The litter from horse stalls is pressed into the drop to absorb the moisture from cows and in front of the cow stable stands a low-down manure truck, which is removed to the meadows or fields when filled. At the head of the feed-room is a water faucet connecting with a cistern on the bank to which the water from the roof is piped. There is also a trough of spring water in the barn lot.

The front elevation is shown in Fig. 30. The double doors to the right open into the carriage-room. The double doors on the left open into the shop, which is fitted up with bench, vise, tool-cases, and so on, and lighted by two windows opposite the doors. The central door enters the hall to the hay-mow and the stairway into the basement. Into it hay falls from the mow at the far end and is put into the racks through trap-doors that fall back against the partition. In warm weather these trap-doors are kept open. In cold weather they are closed down.

The plan of first floor, as well as that of the basement, is drawn to a scale of one-eighth inch to the foot. (See Figs. 31 and 32.)

A—Double door 8′ x 8′ 9″ to carriage-room; B—Single door 6′ x 3′ 3″ and transom 3′ 3″ by 14″; C—Double door 7′ x 8′ to shop; D—Hallway 5′ 6″ by 24′; E—Trap-door for bedding below; F—Trap-door for feed to granary below; G—Stairway to basement; I—Ladder to hay-mow; J—Entrance to cow stable; K—Entrance to horse stable; L—Water faucet; N—Trap-doors to hay-racks below.

The building is covered with best pine shingles, weather-boarded with dressed lumber, battened and painted. The corner posts are 14′ 6″ x 6″. The floors to shop and carriage-room are 1¼″ sycamore and the floor to hay-mow is tongued and grooved pine flooring with no knot-holes.

A KENTUCKY STOCK BARN.

The drawings (Figs. 33 and 34) are of a Kentucky stock barn 20′ wide surrounding a feed-lot 100′ in diameter. The feed-shed with trough and rack next to wall has the south side open to

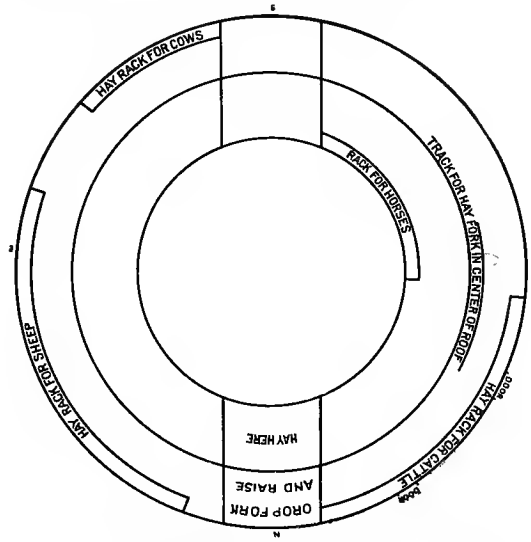


FIG. 33—A KENTUCKY STOCK BARN (MOW PLAN).

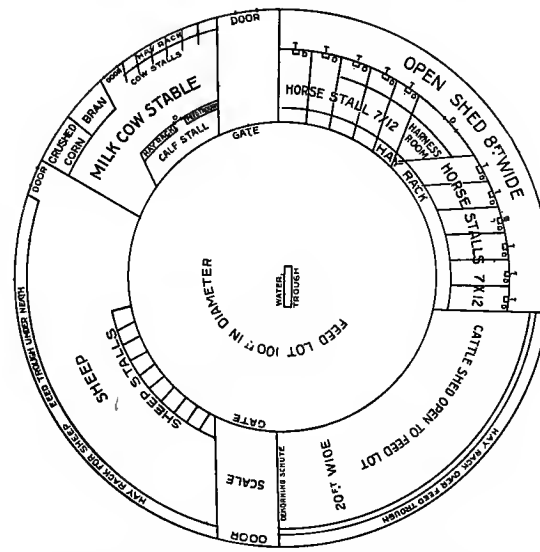


FIG. 34—A KENTUCKY STOCK BARN (GROUP PLAN).

the feed-lot. The barn has a sheep department, hay-rack next to the outside wall and small stalls for ewes and young lambs. It also is provided with stalls for milch cows and calves, boxes for bran and crushed corn and box-stalls for horses; there is an 8′ unboxed passage outside and a loft over all except the scales and gateway, which are open for hoisting hay with fork on an endless track. In this loft there is room to store shredded corn and different kinds of hay. A crib should be made separate and rat-proof.

A SMALL STOCK BARN.

The barn shown in Figs. 35 and 36 is designed to hold 50 tons of hay, to have six horse stalls, 6′ wide, three cow stalls, two box-stalls and a

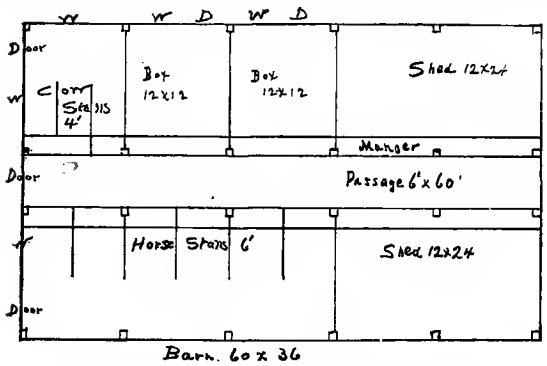


FIG. 35—A SMALL STOCK BARN (GROUND PLAN).

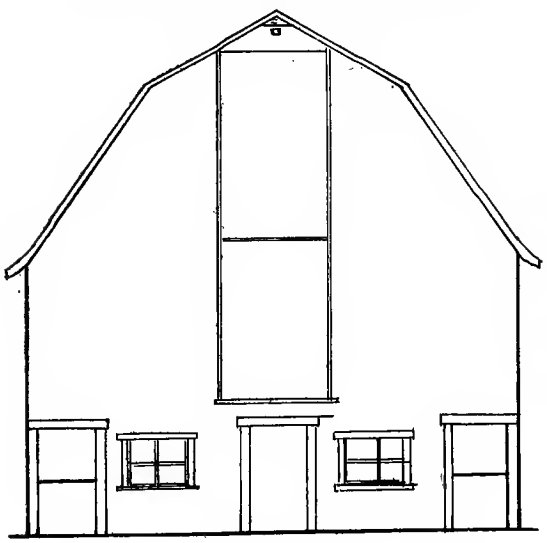


FIG. 36—A SMALL STOCK BARN (END ELEVATION).

cattle shed. The barn is 36′ x 60′, with 20′ posts, a central feed alley and arrangement of stalls and open shed-room as shown. This affords a convenient and economical disposition of material and space. There is room for more than 50 tons of hay. The barn is of joist construction throughout with open center and self-supporting roof.

It is an easy matter to put the self-supporting rafters together on the ground. They are then lifted in one piece, being stayed across the angles with 1″ x 4″ shingle laths. This avoids all necessity of scaffold from plate to plate. Hay, according to the design, is taken in at the end, thus saving the space usually lost in a driveway. Tools, wagons and buggies are best kept in a separate building.

A JOIST FRAME HAY BARN.

This barn is intended to shelter hay and grain until threshing time, after which it may be used in the winter for sheltering cattle. There is no

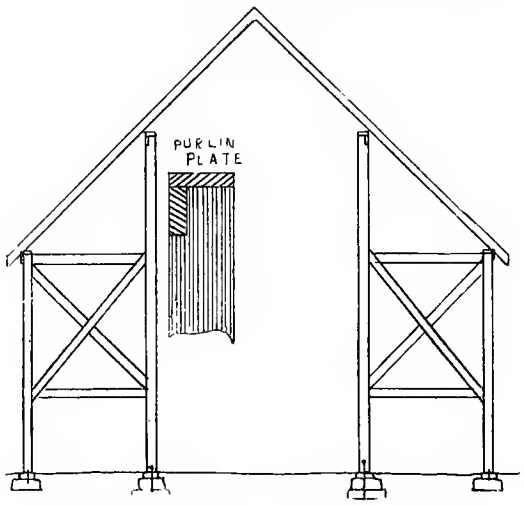


FIG. 37—A JOIST FRAME HAY BARN (CONSTRUCTION).

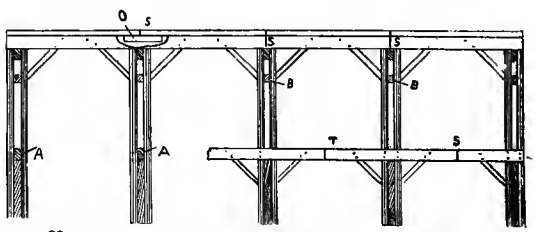


FIG. 38—A JOIST FRAME HAY BARN (DETAILS OF FRAME).

basement to the building and sills and cross-ties are not used.

Make a cross-tie of the ground and anchor each side of the building firmly to large stones on which the purlin posts would set. Fig. 37 shows how this is accomplished. The ¾″ bolt goes down through the foundation stones, the lower one of which is the larger, and fastens firmly to the foot of the post. This makes the building as solid as the ordinary frame.

Fig. 38 shows details of the frame viewed from

the side. A A are ends of the tie shown in Fig. 37. At O the lower piece of plate is shown cut away to show the block, 2″ x 8″, 3′ long, that rests on top of the post and on which the plate splices, as at S S. B B are blocks put in to fill the post where the braces come against it. Nail-

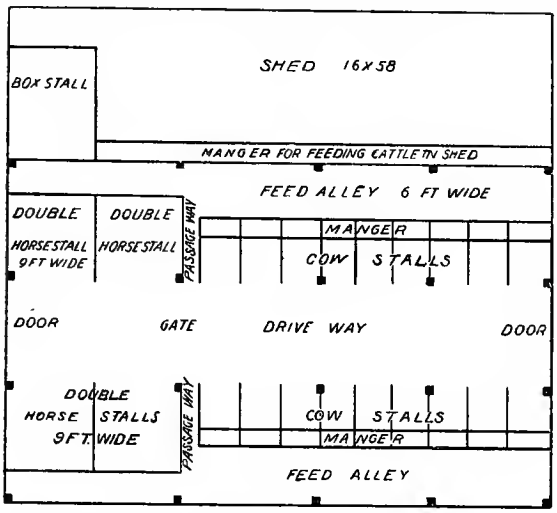


FIG. 40—PLAN FOR A SMALL BARN.

girts are 2″ x 8″ spiked on 4′ apart, not shown in the cut. The tie T splices at S. This tie is double, breaking the joints. Posts are of two pieces 2″ x 10″.

The frame is put together with ½″ carriage bolts and 40-penny spikes. The track for the carrier runs under the peak and the draughts are run in as soon as they clear the level of the hay in the mow. Slings also carry in bound grain.

PLAN FOR A SMALL BARN.

Fig. 40 shows a barn with four double horse stalls, one box-stall and room for 30 cows and 20 other cattle. It is seldom satisfactory to combine a horse and cow barn, as the latter can be more economically built by making it only 30′ wide, but this does not suit so well for the horse stalls. If one could dispense with the driveway it would be better to cut off as much as needed for the horse stable and place the stalls across the building with entry from the outside to each double stall. The oats bin should be placed overhead, so that oats can be drawn down through a spout near the horse stalls. This barn with high curb roof will hold about 60 tons of hay.

GOOD TYPE OF FARM BARN.

The plan illustrated in Fig. 39 shows a cattle barn which is 96′ x 48′. It is a pole barn with posts 20′ high and a corncrib 80′ x 12′ runs through the center of the barn; the lower boards

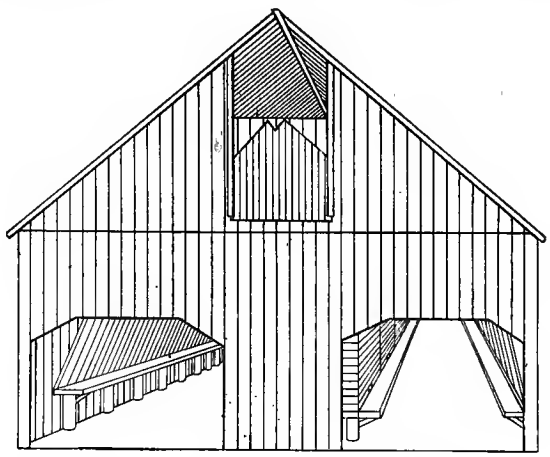


FIG. 39—GOOD TYPE OF FARM BARN (ELEVATION).

of the crib are hinged and feed boxes built on level with the crib bottom so as to make practically a self-feeder, especially when feeding shelled corn. Hay-racks on the sides are 80′ long. Hay is put in at the ends of the barn. Sliding doors, controlled by weights, are used at

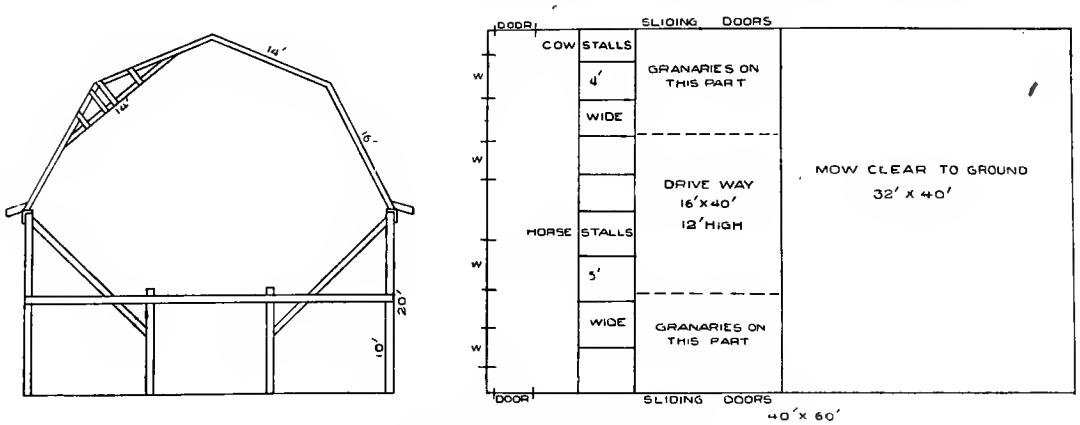


FIG. 41—BARN FOR SMALL FARM.

the ends of the mow. They are closed when the hay is in the mow. There are doors alongside of the hay mow. When filling the mow a space of 4′ between the hay and the sides of the barn may be left so that hay may be thrown into the racks when feeding. The south end is open; the north end has doors which are closed in bad weather. This barn will easily accommodate 100 cattle.

BARN FOR SMALL FARM.

A transverse driveway in a barn is rather a waste of space, as it usually shelters only the farm wagon, yet it is often desired and in this plan (Fig. 41) it is made to do duty as a feed alley. There are stalls for four horses and five cows and a large mow reaching to the ground and granaries over the drive on each side, where they are readily filled by hoisting the grain with a hay-carrier rope. Where roofs are 40′ wide or more there should be the truss method of framing rafters, using 2″ x 4″ brace beneath the angle, fastened by short pieces of 1″ x 4″. This truss must be on both sides of the roof; it is shown on one side only in the diagram.

BARN FOR HORSES AND RANGE CATTLE.

This barn (Figs. 46 and 47) was erected in Wyoming to shelter pure-bred and range cattle

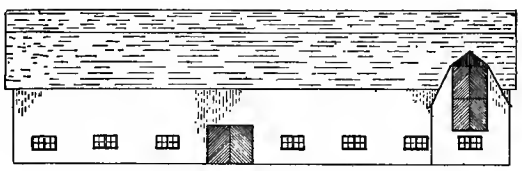


FIG. 46—BARN FOR HORSES AND RANGE CATTLE (SIDE ELEVATION).

and horses. The long shed is open on one side next the yard and forms a good windbreak. The end of this shed is shown to right of cut of the

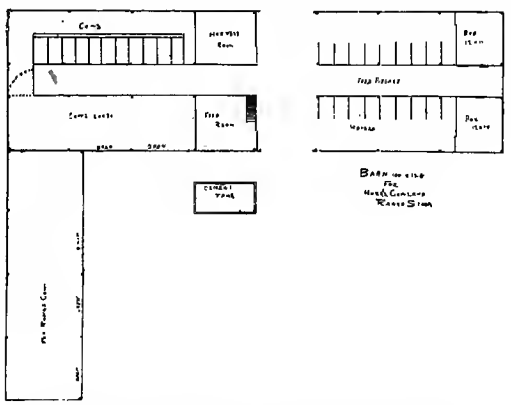


FIG. 47—BARN FOR HORSES AND RANGE CATTLE (PLAN).

elevation instead of the left where it should be located. The framing is of joist construc-

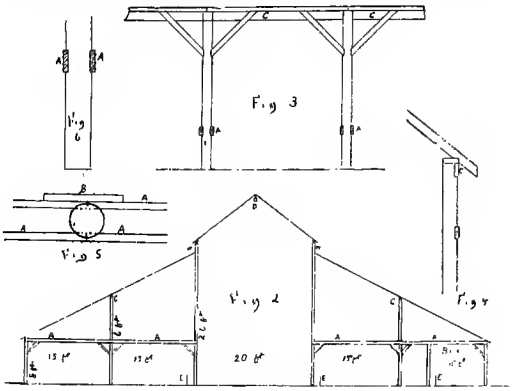


FIG. 42—A BARN OF ROUND POLES.

tion, as illustrated elsewhere; hay is taken in at the end of the shed and from the driveway of the main barn.

A BARN OF ROUND POLES.

There is no cheaper construction where round poles are at hand than that shown in Fig. 42.

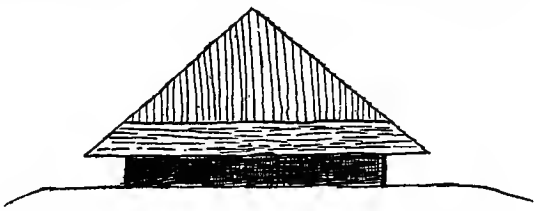


FIG. 43—THE GLIDE UMBRELLA BARN (END VIEW).

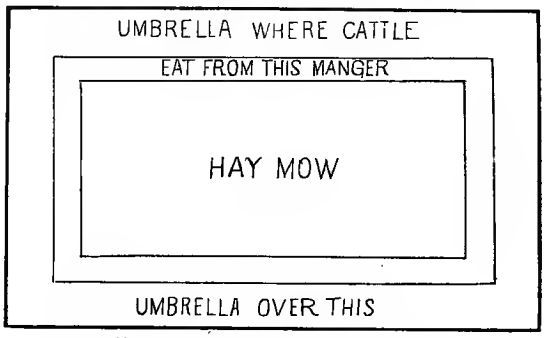


FIG. 44—THE GLIDE UMBRELLA BARN (PLAN).

The poles may be set directly in the ground, though it is better to imbed them in cement, putting down 2″ in the bottom of the hole and ramming 3″ or 4″ more around the sides. This excludes water and adds to the durability of the pole, which, when decayed at the bottom, may be sawed off and filled under with cement or stone. Built as illustrated the rafters form an efficient brace to the central part, in which there

is a hay track and where hay comes directly to the earth. Well braced this building will keep its shape for many years.

THE GLIDE UMBRELLA BARN.

In the Sacramento Valley of California there is little cold weather but some rain in winter. A Mr. Glide has there built an immense barn with a roof projecting about 12′ on every side, beneath which cattle shelter and eat hay stored within. The idea is worth considering in any warm wet country. (See Figs. 43, 44 and 45.)

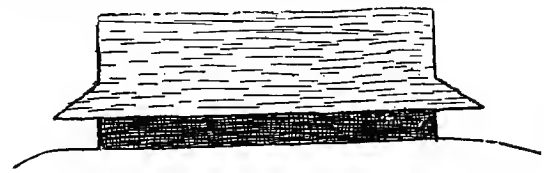


FIG. 45—THE GLIDE UMBRELLA BARN (SIDE VIEW).

CATTLE BARNS.

The ideal location for the barn should be as nearly as possible in the center of the farm. The dwelling of course must be near. The advantage of having as many pastures and fields directly connecting with the barns is obvious. Time, distance, labor, all are saved, and oversight, at all seasons, of the stock made more convenient. The character of the site, however, is of still greater importance, and perhaps there is nothing worse than a low, flat, undrained barnyard and adjacent lots. Strange to say, however, nothing is more common.

If such a location is unavoidable then it will pay to use all the resources of drainage, tile and stone, till even the longest wet spell loses its terrors and planks and rails no longer are needed as bridges to cross the depths and reach the barn door. Wet, and not cold, is the greatest enemy to thrift and flesh, and the floors of all sheds and pens should be high, dry and well drained. The importance of a sufficient number of well fenced, conveniently arranged lots of sizes from a hundred or so square feet up to an acre or two should not be overlooked. There are never too many. There is an infinite variety of wants met by an infinite variety of circumstances, mental peculiarities and financial conditions, resulting in a corresponding variety of farm buildings.

Good air, good light and dryness are foremost in importance; they go together. One of these qualities lacking, the others are almost sure to be absent. The dark, cavernous recesses of very large barns are seldom ventilated or dry. The heavy foundations imply a basement dark, damp and malodorous. The great roof and floors mean heavy timbers, much skilled labor and expense, and last but not least is the chance that some winter night, in red and yellow flame skyward soaring, the huge structure vanishes with all the horrors of agonizing death to helpless animals and to the owner loss immeasurable. More desirable are two or more smaller buildings, all above ground, on light foundations, light timbers with but little framing and far enough apart for some degree of safety from fire and a chance to save life. There should be doors on every side and ample windows. Nothing is so cheap as sunlight and yet nothing is so scarce in the average barn or stable. Another great advantage of somewhat scattered and smaller buildings is the possibility of dividing up the stock and obtaining direct access from different lots and pastures for different classes of stock. It is not uncommon to see in the middle of the night, in a large barn, a hundred cattle aroused and disturbed by one uneasy heifer or lost calf. Avoid all plank flooring as one of the worst temptations of the artful architect. Broken stone (8″) with here and there a 3″ tile running to the outside, with 6″ of porous, yellow clay on top, wetted and tamped, hardening like a brick, will always be dry, never slippery, needs only here and there after the winter is over a little fresh clay and affords no harbor for rats. Many breeders prefer cement floors, which are in common use. Have no narrow, contracted passageways in which the larger cattle will crowd and jam together. A favorite arrangement seems to be a narrow feeding alley, two rows of cattle, heads in, and two narrow passageways behind the cattle. This is a misuse of space, more expensive and no more convenient. Far better have one wide space, not less than 10′, which is less than the 3′ in the center, in which the cattle have ample room to walk quietly to their stalls, where they stand heads to the wall. A hand-cart may be used to distribute the feed (before the cattle come in at night) and every animal always has the same stall. A noted cattle breeder is quoted as saying that time and again he has seen 70 head of cows walk into such a

stable from three entrances and be tied up by two men and munching their feed in 20 minutes, with neither noise, hurry nor confusion.

Every barn should have a mow sufficient at least to supply its inmates with the winter's hay, bins for bran and prepared feed, but it is the opinion of many farmers that the corncribs should be separate and distinct structures.

In latitudes where the mercury only now and then falls below zero animals suffer more from the barn being too warm and close than from cold. In fact but for the difficulty of properly apportioning feed, so far as health is concerned, a good, deep shed, say 20′ from front to rear, with a hay-rack and plenty of bedding, is better than a barn; the air is pure; there are no draughts and no over-heating and no chilling. Health and vitality are in direct proportion to pure air and well bedded is half fed.

No matter how perfect the barn may be nothing can take the place of abundant bedding, and convenience in getting it in and getting it out (in the shape of manure) easily and rapidly is a thing indispensable. The manure should go direct from the stalls to the pastures and cornfields. As long as wheat will pay the cost of production the straw is a sufficient profit to justify the stock raiser in growing it. Sawdust and even dry leaves are useful if straw is lacking. Water in the barn is not generally a success. A large central tank supplying drinking troughs in every lot, fitted with covers to be closed at night in the winter, seems to serve every purpose, and it is a rare day when all kinds of stock should not be turned out for a few hours at least. Thirsty cattle coming suddenly out of an overheated barn may be hurt by drinking ice water but the cold air has the same effect and the condition of the cattle is the fault.

Hinges of course are obsolete. Nothing but the best of rollers should be used, the track of iron, put up as true and solid as it is possible to have it, and then watch and keep clean the groove in which it runs at the bottom. Box-stalls should be built wherever a roof can be extended along the sides without cutting off the light and air from the main building. A long shed closed in front and divided into box-stalls, on the north side of a lot, is of great utility. One or two extra warm ones should always be provided a little to one side for winter-night calving, sick animals and the like.

Many patent fastenings have been suggested and advertised but after all nothing in practice has been found more convenient, more speedy or more safe than the old-fashioned German chain cattle tie with about a foot play on a vertical ½″ iron rod under the edge of the manger. The cattle have perfect freedom up and down and can reach to the center of the manger of an 8′ or 9′ double stall. When taken off the cattle the end ring should be hooked over a nail in the side of the stall just above the animal's neck, where it is just in place for use at night.

A KANSAS CATTLE BARN.

The diagram (Figs. 48 and 49), as will be seen, fully carries out the idea that an expensive, elaborate barn is not a necessary adjunct to successful cattle breeding in the Western States, but that reasonable shelter for the herd from the rigors of winter and some little outlay for the protection of the hay is in keeping with the best principles of economy. This barn was built by Col. W. A. Harris on his Linwood Farm in

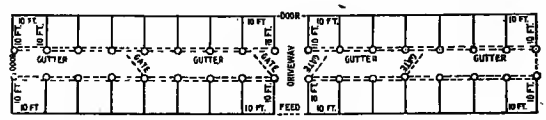
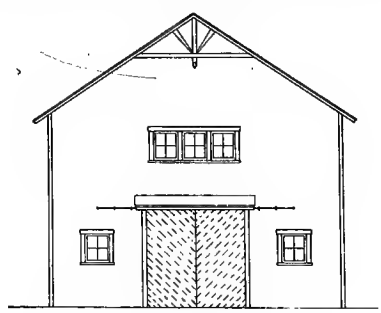


FIG. 48—A KANSAS CATTLE BARN (GROUND PLAN).

Kansas. The unpretentious yet admirably arranged building (briefly described herewith) was built many years ago and has given the best of satisfaction. The materials used in its construction were as follows: 32 telegraph poles, 20′ long; 32 telegraph poles, 25′ long; 6,000′ of boards, 16′ long; 30,000 shingles; 400 battens, 3″ x ½″, 16′ long; 34 sashes, 4 lights, 10″ x 12″; 4,500′ of flooring; 200 joists, 2″ x 8″, 16′ long; 2,500′ of rough boards; 250 pieces, 2″ x 4″, 16′ long; 1,400′ of masonry in underpinning.



FRONT ELEVATION

FIG. 49—A KANSAS CATTLE BARN.

Points in favor of this cattle barn are cheapness, light, ventilation and ample room. The wide alleyway permits the ready and uncrowded passage of cattle, and the same is true of the stalls. Wagons go through and take up the manure, which goes direct to the fields. Bedding is distributed in the same way, and hay from the outside is distributed in this way, holding in reserve that in the mow. The dirt floor is cheap and never slippery. The holes which wear are readily filled by a load or two of dry earth which is at once an absorbent and deodorizer. All the

FIG. 50—THE MORGAN COW BARN (FRONT ELEVATION).

windows open on one side or the other (to the leeward) and have no "wheezing" or "coughing." It was built by two carpenters and four laborers in thirty days and cost about $1,100. The mow holds nearly 140 tons of hay by filling up after the first has settled.

THE MORGAN COW BARN.

The barn shown in Figs. 50 and 51 is T-shaped, 412′ across the front and extending back 280′. It was recently built by F. W. Morgan on his Wisconsin farm. The entire barn covers about three-quarters of an acre. There are two silos in connection with the barn, the forward one being 25′ inside diameter with 18″ walls and 40′ high with 8′ in ground. The other silo is 30′ inside diameter and 40′ high. Both are constructed of grout, a mixture of four parts ordinary gravel, two parts sand and one part Portland cement. These silos have given good satisfaction. The entire floor of the barn is also made of grout. A patent roofing is used in covering both the sides and roof. This is composed of layers of felt, burlap and felt, the three coats being cemented

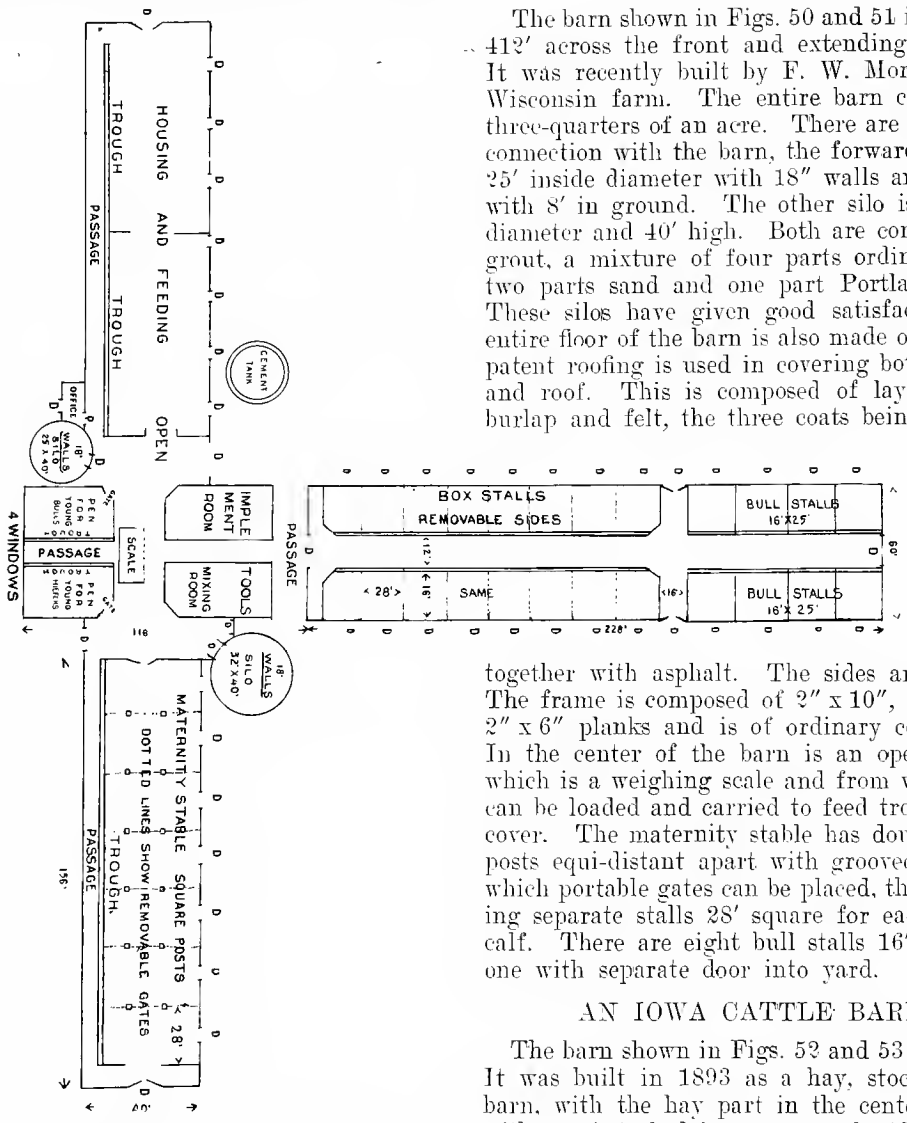


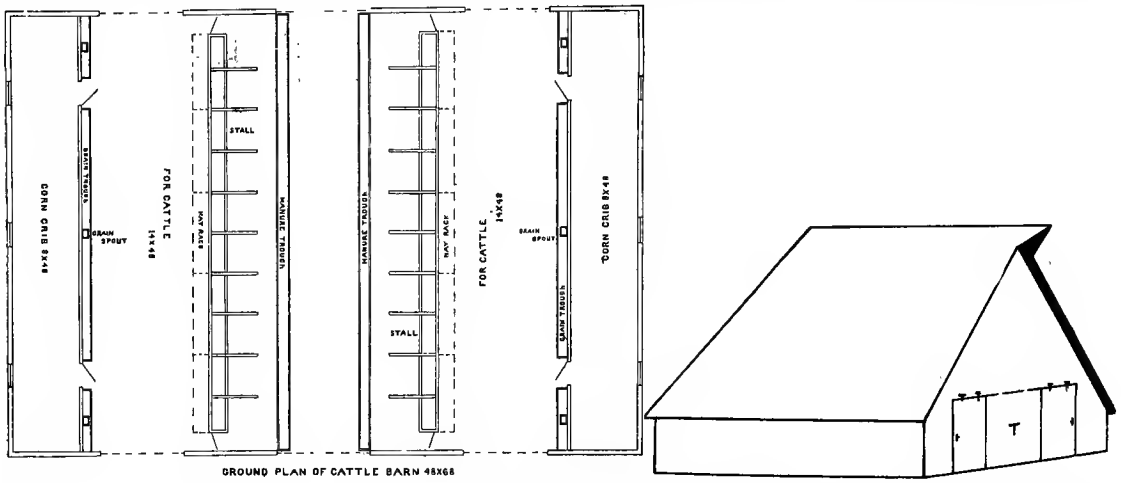
FIG. 51—THE MORGAN COW BARN (GROUND PLAN).

together with asphalt. The sides are battened. The frame is composed of 2″ x 10″, 6″ x 6″ and 2″ x 6″ planks and is of ordinary construction. In the center of the barn is an open space in which is a weighing scale and from which silage can be loaded and carried to feed troughs under cover. The maternity stable has double rows of posts equi-distant apart with grooved sides into which portable gates can be placed, thereby forming separate stalls 28′ square for each cow and calf. There are eight bull stalls 16′ x 25′, each one with separate door into yard.

AN IOWA CATTLE BARN.

The barn shown in Figs. 52 and 53 is 48′ x 68′. It was built in 1893 as a hay, stock and feed barn, with the hay part in the center 24′ x 48′, with a 14′ stock driveway on each side and corn-

cribs 8′ x 48′ on each side of stock-way, with troughs in the stock-way next to crib and oat-bin over each stock-way, with chutes leading to troughs below. As thus arranged the barn holds 3,000 bushels of corn, 1,500 bushels of oats and 65 tons of hay, with feeding room for 40 head of cattle.



FIGS. 52 AND 53—AN IOWA CATTLE BARN.

In order to increase the stock room and reduce the hay compartment the center part was changed into a cattle-barn, providing room for 20 cattle in stalls, with the same stock room outside of this as before. A feed-bin 8′ x 6′ x 48′ was built, with a chute to stalls below. There is room for 60 cattle (20 stalled), 3,000 bushels of ear-corn, 1,500 bushels of oats, 1,000 bushels of shelled corn or ground feed and about 40 tons of hay. The frame is whiteoak poles set in ground every 8′ except at cribs, where they are 4′ apart, with additional foundations set on stone under each crib.

A HAWKEYE CATTLE BARN.

The cattle barn shown in Figs. 54 and 55 was built for C. S. Barclay of Iowa. The capacity of the barn figures as follows: Hay, 240 tons; grain, 9,000 bushels; cattle, 100 head; horses, 10 head. The frame is balloon construction and all of native hard-wood, the lumber being sawed on Mr. Barclay's farm. With the exception of the 4″ x 12″ sill there is nothing thicker than 2″ in the frame, the girders, posts and some other members being built up.

This makes a much stronger job and saves time in the framing. The back 45′ of the first floor is used as the main mow. The bents which form the frame in this part of the barn are so constructed that no cross-tie beams are required. This arrangement requires less labor and material and makes a stronger construction, besides doing away with the objectionable tie-beams. The frame is all securely bolted together.

A dump elevator and grinding machinery are so installed as to save much labor. (See Fig. 57.) The power required to run the machinery is furnished by a 12-horse power portable gasoline engine. Chutes are so arranged that all kinds of feed are accessible in the feed room without handling. A water supply is also installed. (See Fig. 56.)

The floor in the driveway of the basement and also in part of the stalls is of paving brick laid

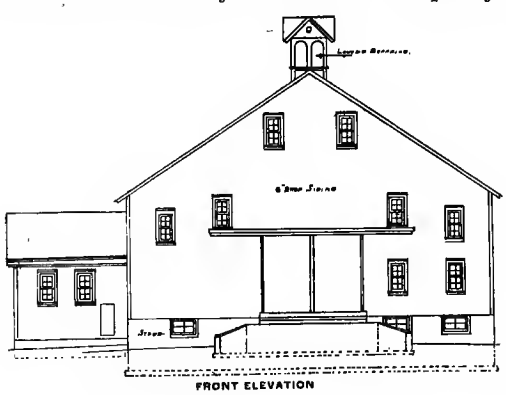


FIG. 54—A HAWKEYE CATTLE BARN.

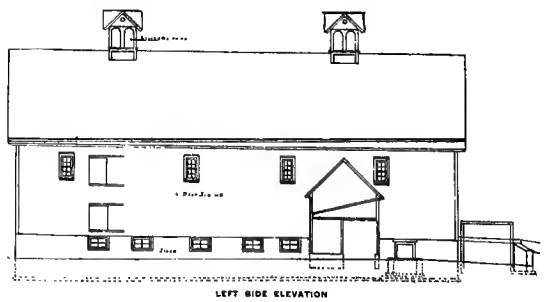


FIG. 55—HAWKEYE CATTLE BARN.

on a bed of sand, the cracks between the bricks being washed full of thin cement. The remainder of the floor in the basement is of concrete. The floor for the house stable, which is on the first floor, is of concrete.

Behind the stalls the concrete is covered with 2″ flooring. The stalls are provided with hardwood gratings, which can be removed for cleaning. The cattle mangers and feed-racks are a new departure. The barn cost about $6,000.

ANOTHER KANSAS CATTLE BARN.

This barn is built of joist construction, no piece being more than 2″ thick. It has ample storage for all the cattle that can get beneath the roof and is so constructed that winds have little effect upon it, the low roof deflecting them harmlessly upward.

The dimensions are 60′ x 112′. It is so designed, however, that the length may at any

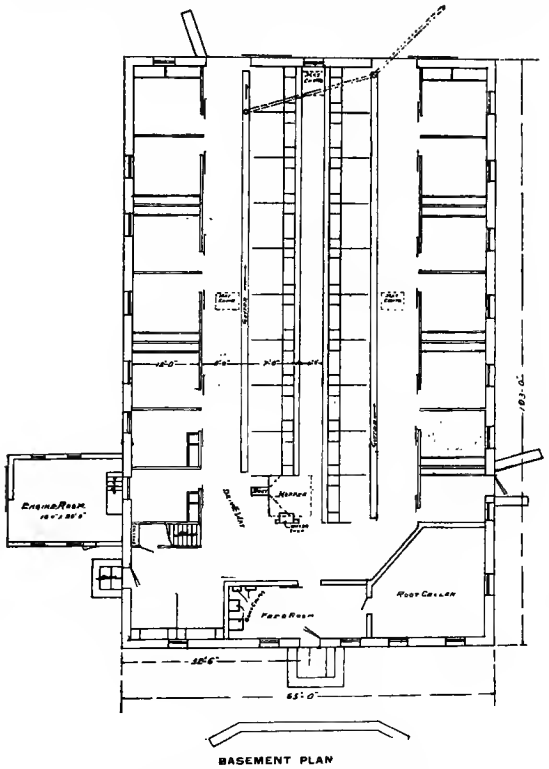


FIG. 56—HAWKEYE CATTLE BARN.

time be increased by adding more bents. The principle of construction is clearly shown in Fig. 58, an end elevation showing a doorway framed to take in hay from the outside. This feature is not in the barn as built.

This barn has the open-center which admits of hay being unloaded by slings and carriers that do not raise the hay higher than high enough to clear the level of the top of the mow before they swing back.

The interior arrangement as adapted to the feeding of young beef cattle also is shown in Fig. 58. The exterior is nicely presented in the diagrams.

This barn has been extensively copied. It is unique in that it dispenses with siding except at the ends, and for strength, cheapness and general

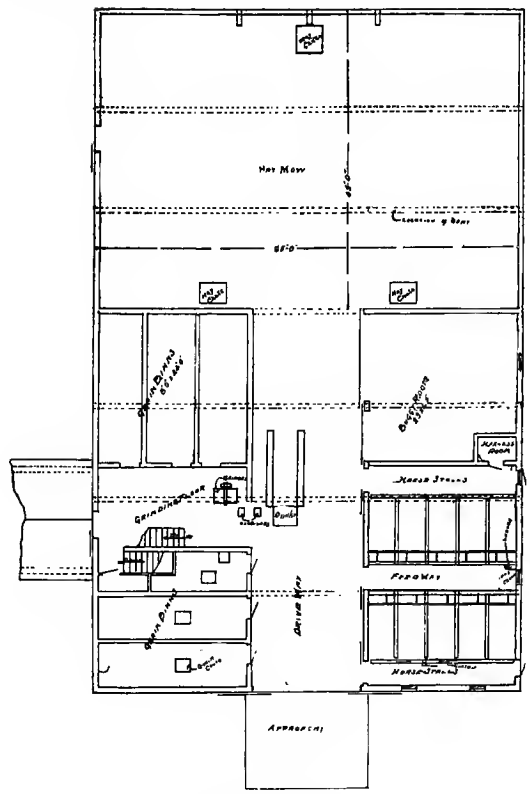


FIG. 57—HAWKEYE CATTLE BARN.

desirability it has hardly a rival in the class of large barns.

AN INDIANA CATTLE BARN.

One of the largest and best cattle barns in the country is that erected by F. A. Nave of Indiana for his Fairview Hereford herd. Its construction is clearly shown in the diagrams from the architect's plans. The dimensions are 120′ long, 64′ wide and 18′ to the eaves. It runs east and west and is set into a bank that affords driveways from the level onto the upper floor at the east end and the northwest corner. A heavy stone wall runs along the entire east and north sides, but the ground falls away sufficiently on the north to allow of ample window space. Doors open at frequent intervals on the south side into good-

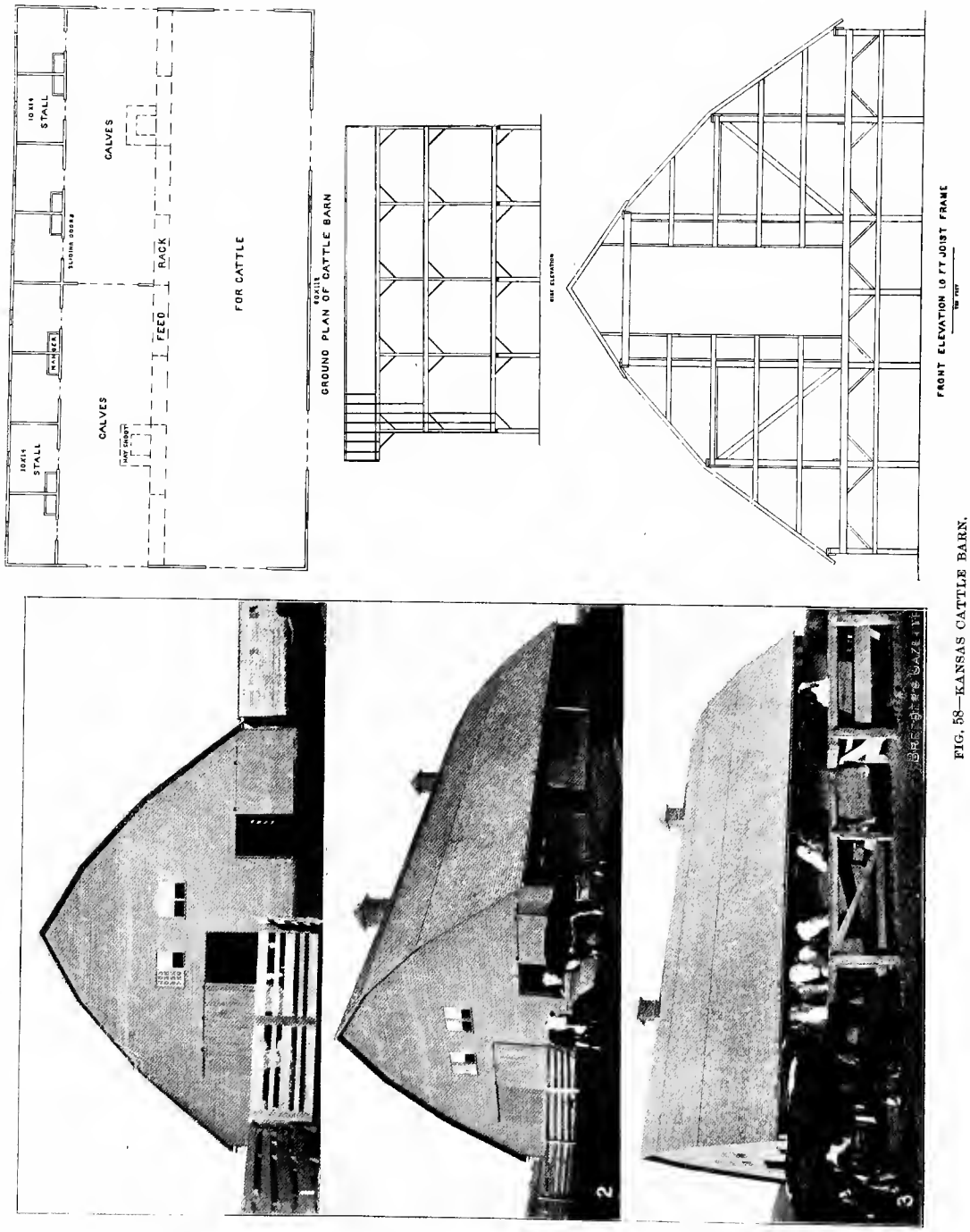


FIG. 58—KANSAS CATTLE BARN.

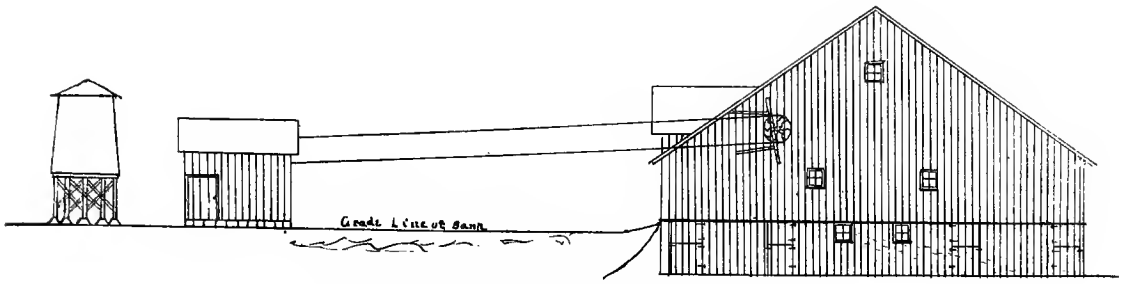


FIG. 59—AN INDIANA CATTLE BARN (REAR ELEVATION).

sized and well-drained paddocks, and the fall is equally good on the west. Fig. 59 shows the rear (west) elevation, and also the engine-house and water tank. A large gasoline engine pumps water and runs corn-sheller, grinder, fodder-shredder and hay-cutter on the upper floor. While possibly a little power may be lost in transmission, yet the engine is adequate, and this small loss is more than compensated for by the protection from fire in this detached engine-house. The well is equipped with a 6″ pipe and the supply is fairly inexhaustible. Hot and cold water is on tap in the barn. The entrance to the huge upper floor for hay and corn-fodder is at the corner nearest the engine-house.

The side of the framework is shown in Fig. 60. The posts are all set on stone foundations. Fig. 61 gives an idea of the framing of the barn, showing an end and an inside bent. The ends are strongly framed and a very large inside space is clear. The ground plan is indicated in Fig. 62, which shows the arrangement of the stalls. A row of large boxes runs through the center and the middle partitions through the entire row are movable, so that two boxes may be thrown into one. On either side the cows with calves may be tied, two to a stall, although each stall will comfortably accommodate three cows. The convenience of the calf pens needs no explanation. This barn is very substantially built but without extravagance. It was designed throughout by Mr. Nave as the most convenient plan that he

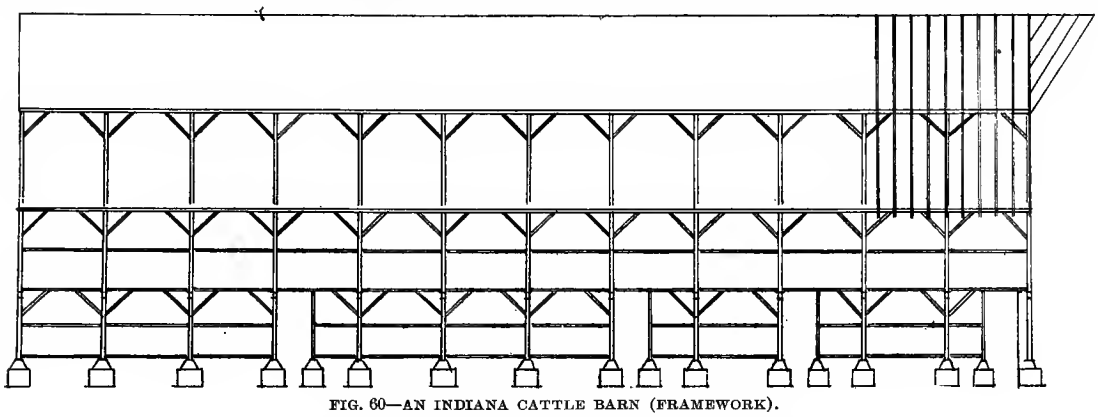


FIG. 60—AN INDIANA CATTLE BARN (FRAMEWORK).

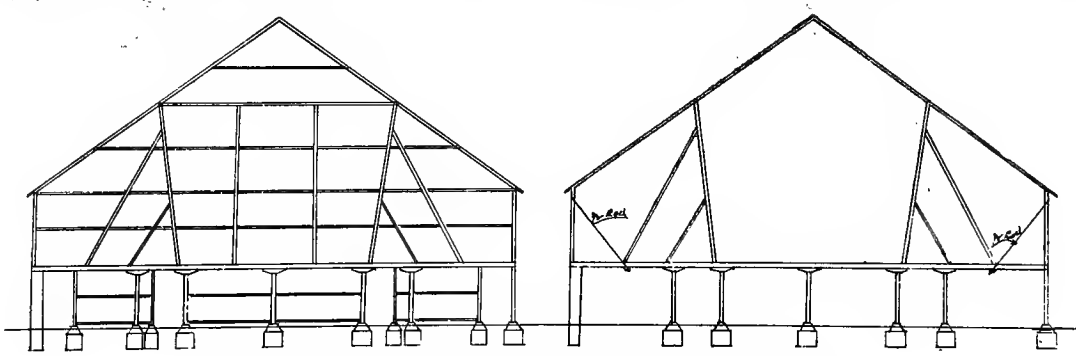


FIG. 61—AN INDIANA CATTLE BARN (FRAMEWORK AND FOUNDATION).

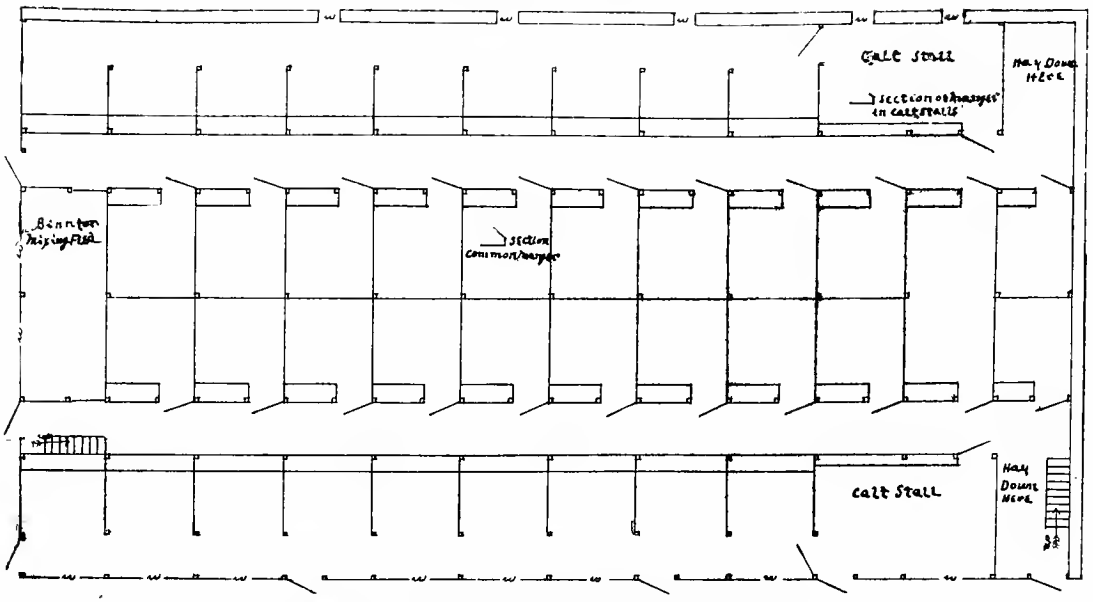


FIG. 62—AN INDIANA CATTLE BARN (GROUND FLOOR PLAN).

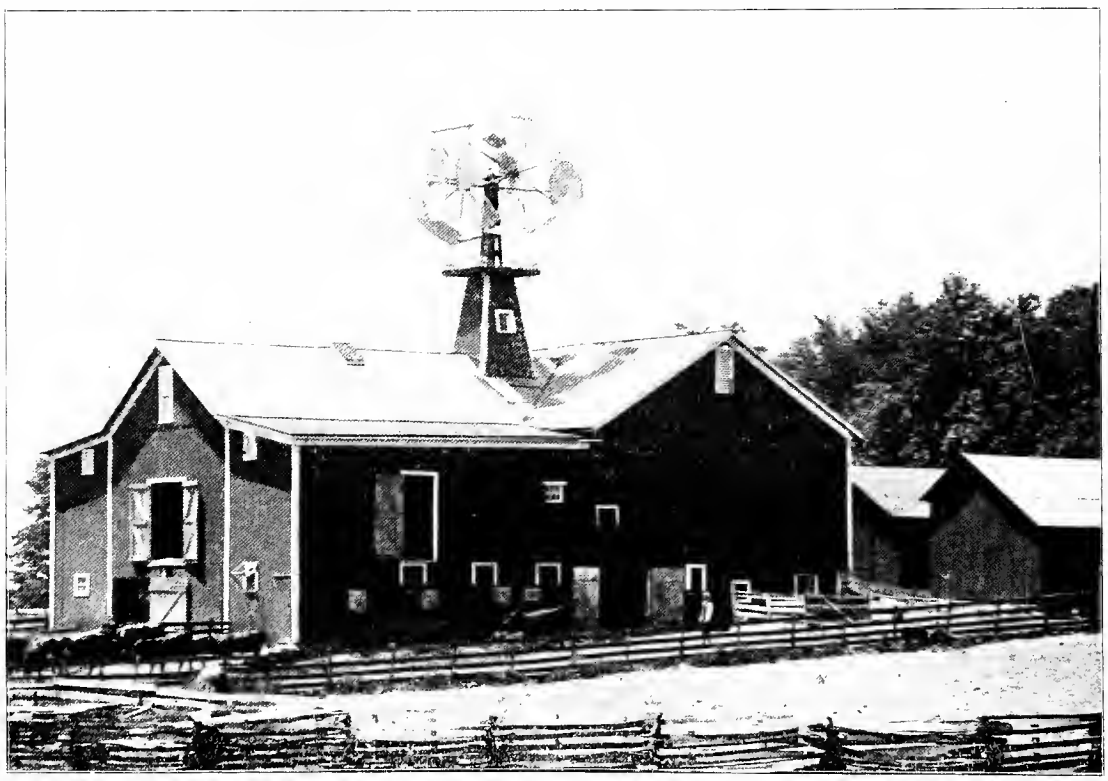


FIG. 63—A HOOSIER CATTLE BARN (SIDE ELEVATION).

could figure out for the economical care of a large herd. It will easily accommodate 150 head of cattle, and 200 head may be comfortably housed without crowding.

The second story will hold all the provender and forage needed for a large herd, thus doing away with the necessity of hay barns and fodder stacks. In the west end the mill rooms are lo-

cated, and the prepared feed drops below to the mixing floor.

A HOOSIER CATTLE BARN.

Figs. 63 and 64 show the ground plan, interior arrangement and elevation of one of the large cattle barns on the farm of J. H. Miller of Indiana. The arrangement of this barn is very convenient, and while it is large and roomy it has not cost an extravagant amount of money. The advantage of the arrangement of the different stalls and paddocks will be readily perceived, and

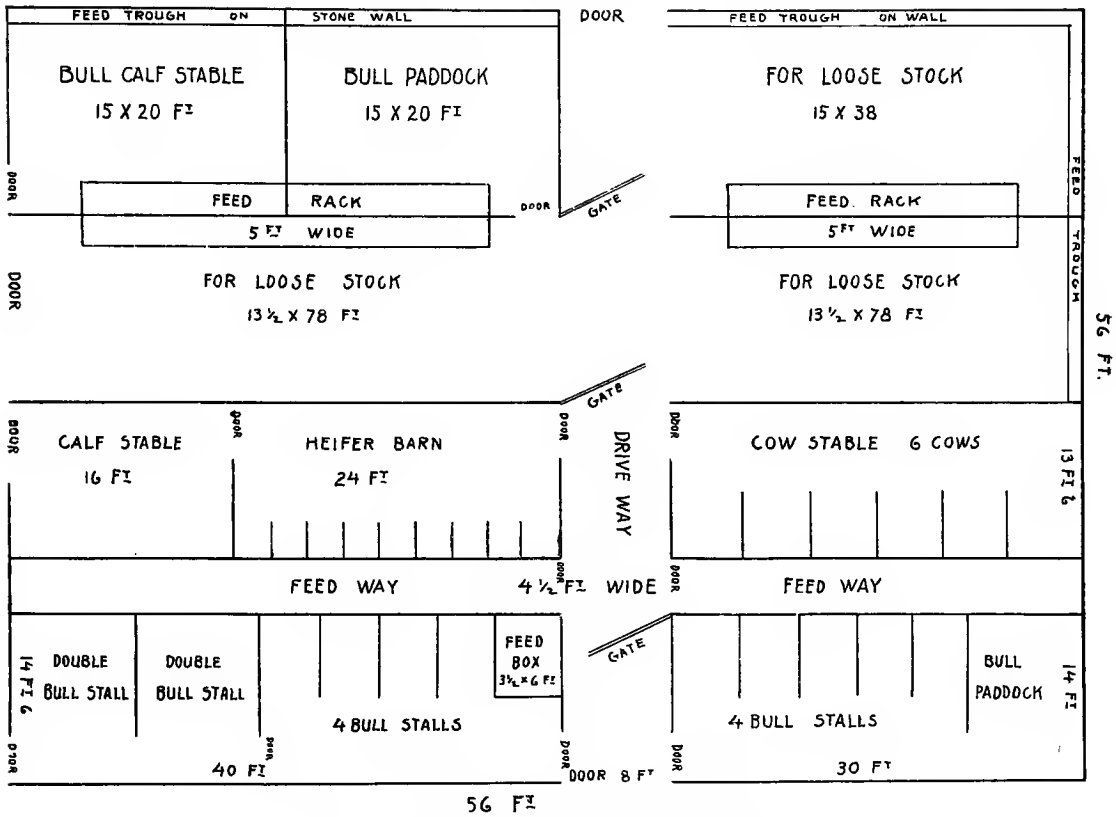


FIG. 64—A HOOSIER CATTLE BARN (BASEMENT PLAN).

it will be noticed that a wide driveway extends through the barn from north to south, so that the stalls can all be conveniently cleaned and the manure hauled away readily without much extra labor.

The feed-bins are on the second floor with chutes to the basement. There is a traveling feed-box of about ten-bushel capacity swung to a steel hay track above the feedway, running the whole length of the barn, 78′. Above the basement is a large hay mow and roofs for feed and machinery. The basement itself it 8′ high, the posts are 12″ x 12″; joists, 2″ x 12″; braces, 4″ x 4″; rafters, 2″ x 4″, and the barn cost about $2,500.

AN OCTAGONAL CATTLE BARN.

An octagonal barn that will accommodate about 50 head of cattle is shown in Figs. 65 and 66.

The octagonal form has always seemed open to the objection of being hard to fill with hay and more difficult to arrange in the interior. However, it may be that the great amount of space secured at the cost of a much less amount in the square form more than balances the objection. This octagonal barn of 25′ on a side has in it about 800 square feet more space than the same amount of wall in a square form. That is equal to gaining a barn 20′ x 40′. However, the main objection, that of filling the barn, remains to be attacked. This may largely be overcome by erecting a gable on one of the sides of the roof and running a track in from that height which may be carried across to within 20′ of the opposite side, and that will serve very well to distribute the hay.

The walls should be made 24′ high, the base-

ment 8′ to 10′, the roof will rise 20′ and the little turret in the peak will be about 48′ above the foundation. The roof is self-supporting, the plates being bolted together at the corners and held by a band of iron 4′ long bent to fit and solidly bolted so that the corners can never spread. The plates are of 2″ x 12″, two parts. All parts are of joist construction.

The basement plan shows stalls for over 60 cattle; the larger cattle would be in the outer circle, the smaller ones in the inner row. One

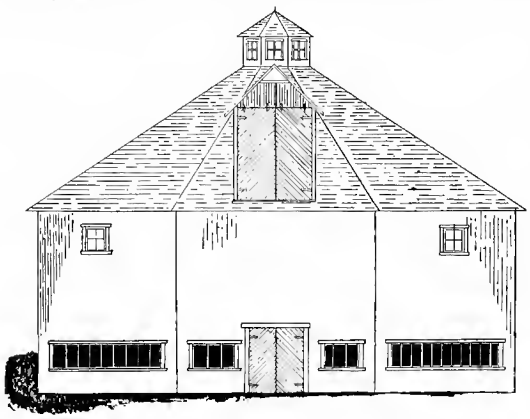


FIG. 65—AN OCTAGONAL CATTLE BARN (ELEVATION).

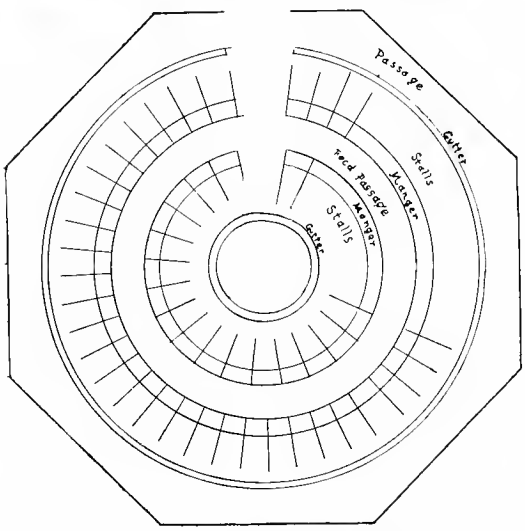


FIG. 66—AN OCTAGONAL CATTLE BARN (GROUND PLAN).

feeding alley serves for the two rows and a circular track brings in grain or silage and another circular track and conveyor takes away the manure. Above the passage and just within the outer door there will be chutes from above, down which will come hay, bran and other feed, the granaries being located there and filled from the same door that takes in hay. There would be other hay chutes leading down to the feed alley.

Abundant light and air are let in to the basement by a practically continuous window 3′ high and 3′ above the ground. The sashes of this window hinge at the bottom edge and incline inward, each one being opened all at one motion or closed by a motion, the mechanism being the familiar contrivance employed in greenhouse construction. The outer walk is 4′ wide at its narrowest point. Perhaps 3′ would be better, as it would give more room between the cattle, and with the manure conveyors there is not the need of wide passages that there once was. Cement floor throughout and Van Norman stalls complete the basement construction.

A CORN-BELT BARN.

The Illinois barn illustrated in Figs. 67, 68 and 69 has an immense storage capacity afforded for hay and straw, and in view of the vast quan-

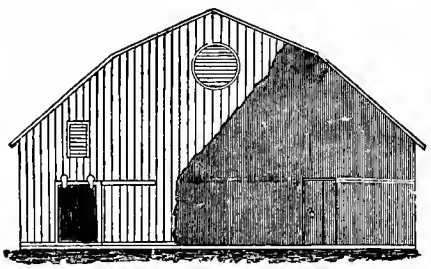


FIG. 67—A CORN-BELT BARN (END SECTION).

tity of forage of that description wasted annually from lack of protection from the inclement weather the question arises as to whether or not more attention should be given to that subject in the construction of barns.

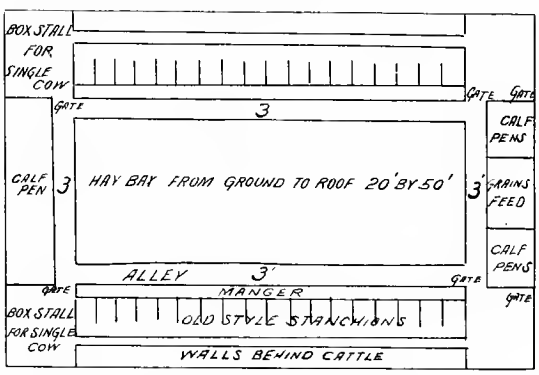


FIG. 69—A CORN-BELT BARN (GROUND PLAN).

The plan indicates a barn 50′ x 70′, with cattle stalls and a 3′ alley on each side, central space and entire area above the stalls being devoted to the mowing of hay and straw. The "end section" (Fig. 67) is intended to show this arrangement.

There are doors at the rear end of the barn the same as in front and over the main doors in the

rear are two smaller doors wide enough to admit the straw-carrier of a threshing machine, so that when threshing the machine dumps the straw into the loft of the barn over the stack on either or both sides by moving the machine. There is also a large door 10′ x 9′ for taking hay from the load by the horse hay forks on a track running the entire length of the comb of the barn, hauled up by horse at the other end of the barn.

Material of the following description is used:

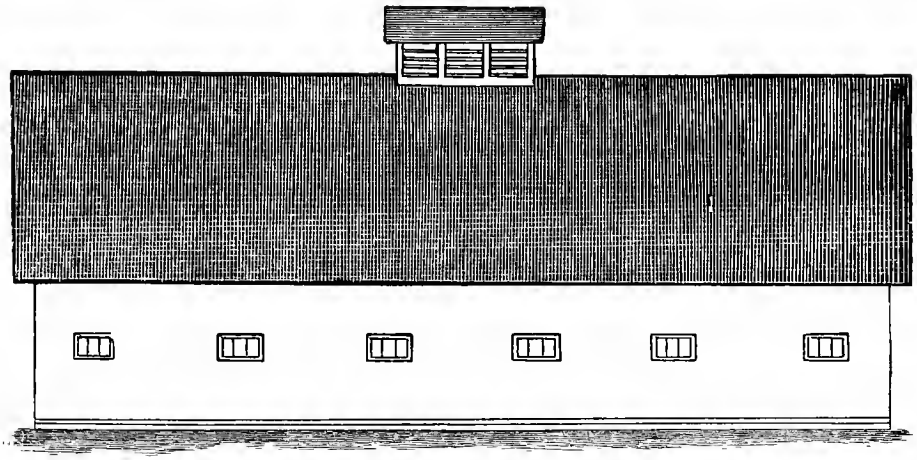


FIG. 68—A CORN-BELT BARN (SIDE ELEVATION).

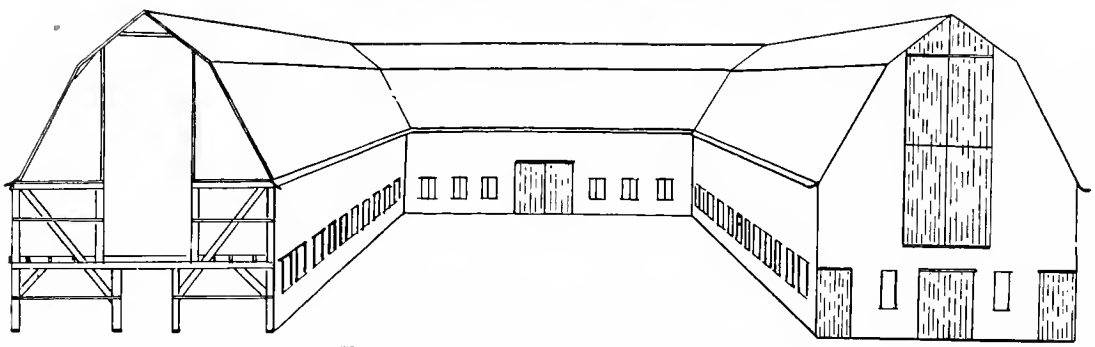


FIG. 70—MODERN TYPE OF CATTLE BARN (ELEVATION).

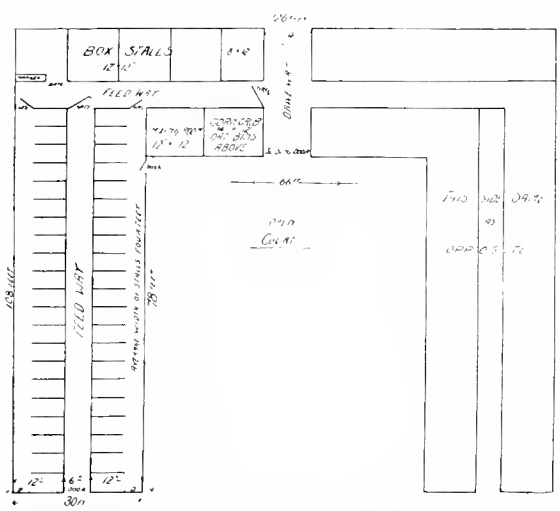


FIG. 71—MODERN TYPE OF CATTLE BARN (GROUND PLAN).

Sills, 6″ x 8″; joists, 2″ x 8″; corner posts, 6″ x 6″; other posts, 4″ x 6″; braces, 4″ x 4″; girts, 2″ x 4″; plates, 4″ x 6″; rafters, 2″ x 4″; sheeting, second fencing; shingles, 18″, best; siding, 12″ stock boards; flooring, 2″ x 8″.

MODERN TYPE OF CATTLE BARN.

A sanitary, comfortable and commodious barn recently built is that designed by Joseph E. Wing for H. H. Trimble of Iowa. It has 84 single stalls and 10 box-stalls or breeding pens. There are bins for grain and storage for 350 tons of forage above. Silos may be conveniently added, one at the end of each wing, where the feed-carrier will convey the silage down the central alley between the rows of cattle.

The barn is 30′ wide and forms three sides of an open court (Fig. 70), 66′ x 78′, which is designed to be paved with vitrified brick or concreted, having a water tank in center, thus form-

ing a convenient sheltered yard where cattle may exercise any day in severe weather. Fig. 71 shows the ground floor. The specifications provide this barn with manure-carriers behind the cattle, feed carriers with track in front of them and numerous windows to admit light and air. The windows are hinged at the lower edge and open inward with greenhouse construction, so that a

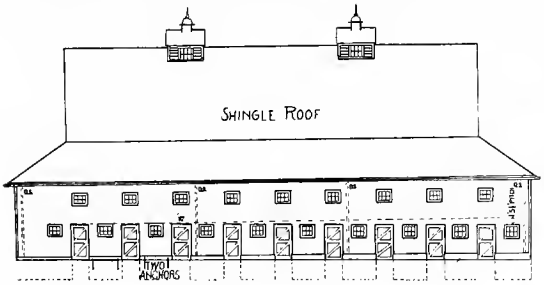


FIG. 74—AN ILLINOIS CATTLE BARN (SIDE ELEVATION).

turn of a wheel opens a row of them. Sectional hay chutes extend down into the feed alleys. The barn has cement floors and Van Norman stalls. This barn has proved very satisfactory to the proprietor, who says that "we believe we have saved $1,000 of its cost in one season in grain and hay and in preventing loss of flesh in the animals."

A BARN FOR BREEDING CATTLE.

The cattle barn at the Willow Lawn farm of E. Reynolds & Son of Illinois is 56′ x 124′. It is 22′ to the eaves and 48′ to the peak, giving ample pitch to the roof. This barn will hold about 300 tons of hay and there is a place directly over the meal bin for two carloads of bran or feed. One floor of the barn is cement, having a slope of 5″ from where the cows are chained in the box-stalls. The stalls also slope 2″ from

FIG. 72—A BARN FOR BREEDING CATTLE (END ELEVATION).

outside the barn to the drain behind the cows. The drain slopes gradually from both ends toward the center, where there is a till to receive the liquid. There are six large ventilators running from the bottom of the barn up to the

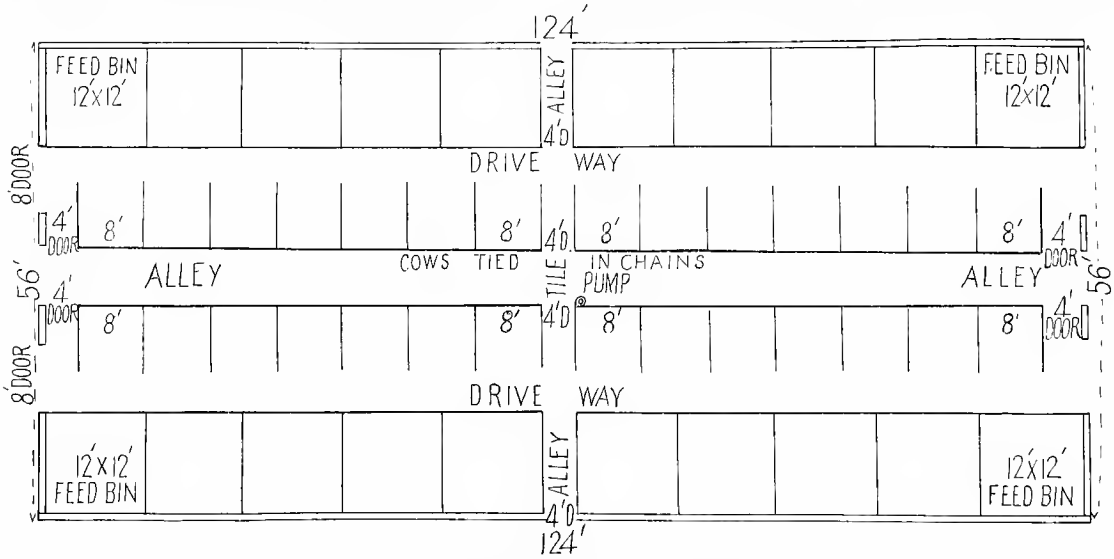


FIG. 73—A BARN FOR BREEDING CATTLE (GROUND PLAN)

cupolas. There are 24 windows below and several opening into the loft. (See Figs. 72 and 73.) The barn cost about $4,000.

ILLINOIS CATTLE BARN.

Col. Frank O. Lowden's large cattle barn on his farm in Illinois is one of the most complete and conveniently arranged buildings to be found. There is a perfet system of water-works and sew-

erage in the barns and yards and there are water troughs in every yard that drain directly into the sewer, so that when not in use they can be

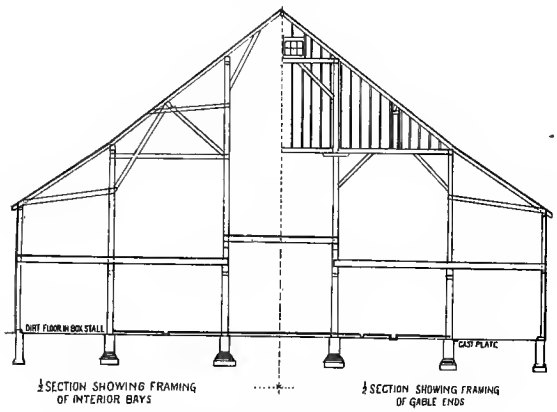


FIG. 75—ILLINOIS CATTLE BARN (SECTION).

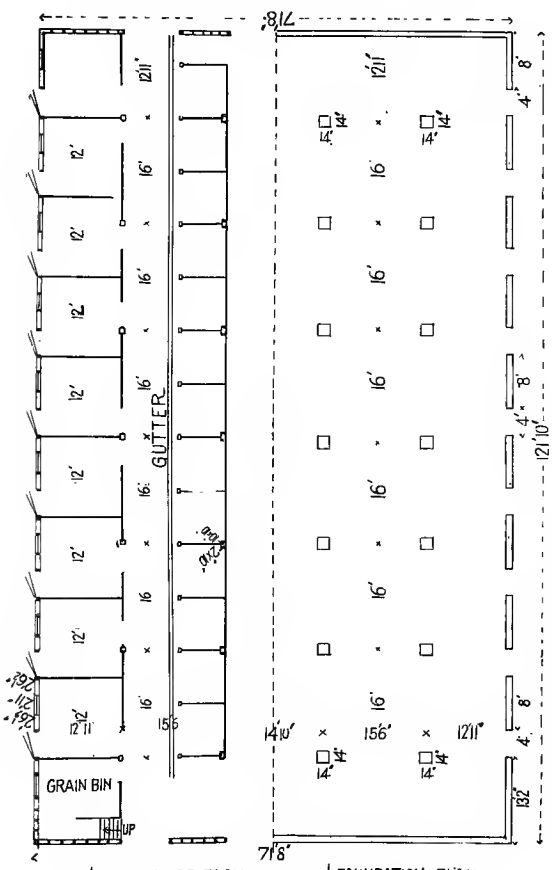


FIG. 76—ILLINOIS CATTLE BARN (PLAN).

drained, thereby obviating the danger of freezing and insuring water of even temperature at all times.

The dimensions of this barn are 71′ 8″ x 121′-10″. The diagrams shown in Figs. 74, 75 and 76 present a clear idea of its arrangement.

Feed is conveyed by trolley cars on either side of the main floor and in front of the cattle stalls. The capacity of the hay loft is 260 tons. The hay is taken up in the center of the barn and conveyed by reversible carriers to either end of the barn and is thrown down in center of main floor to feed cattle in the stalls. The racks in the box-stalls are filled directly from the loft through trap doors in the floor which may be closed when not in use. Alleys behind the stalls are wide enough so that a manure spreader for receiving the manure may be driven through and taken directly to the fields.

AN OPEN CENTER CATTLE BARN.

The cattle barn shown herewith is 50′ x 105′ with a basement 10′ high and second floor posts

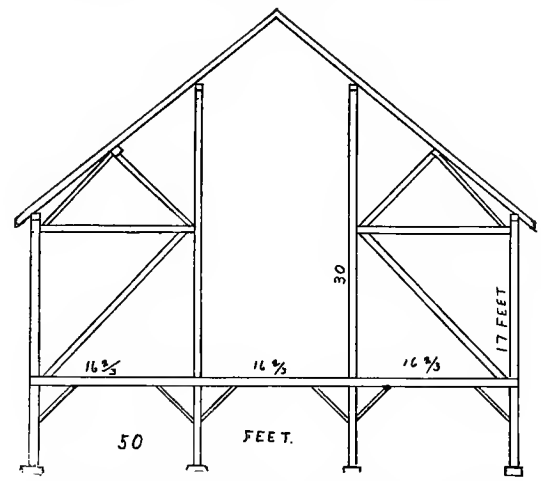


FIG. 77—AN OPEN CENTER CATTLE BARN (FRAME WORK).

16′. Fig. 77 illustrates plainly the method of frame. It will be seen that this is an open-center barn. With large barns of this type there must be unloaded a great deal of hay and there is nothing that compares with the sling for unloading hay, and the use of the sling calls for an open-center barn with no ties across the mow floor. Two purlin plates support the roof. The roof is half pitch. This frame is built of solid timber but 2″ joists may be used. In this case a few hundred dollars in expense may be saved and perhaps a stronger and better frame secured.

Fig. 78 shows the basement floor. The feed passage is 4′ wide with the mangers taken off; hay is thrown directly into the feed passage down chutes reaching from the mow above and coming down the purlin posts. There is room between the rows of stalls for the driving in of the wagons to clean out the trenches, although there is not room to drive in between the cows when they

are in their stalls. The stalls may be put further apart than they are if it is not thought best to turn the cattle into the yard while the stable is being cleaned. The stalls are 3½′ apart, thus getting 14 animals in a row. The whole barn may be divided in this way or part of it may be made into pens in which polled or dehorned cattle may run loose.

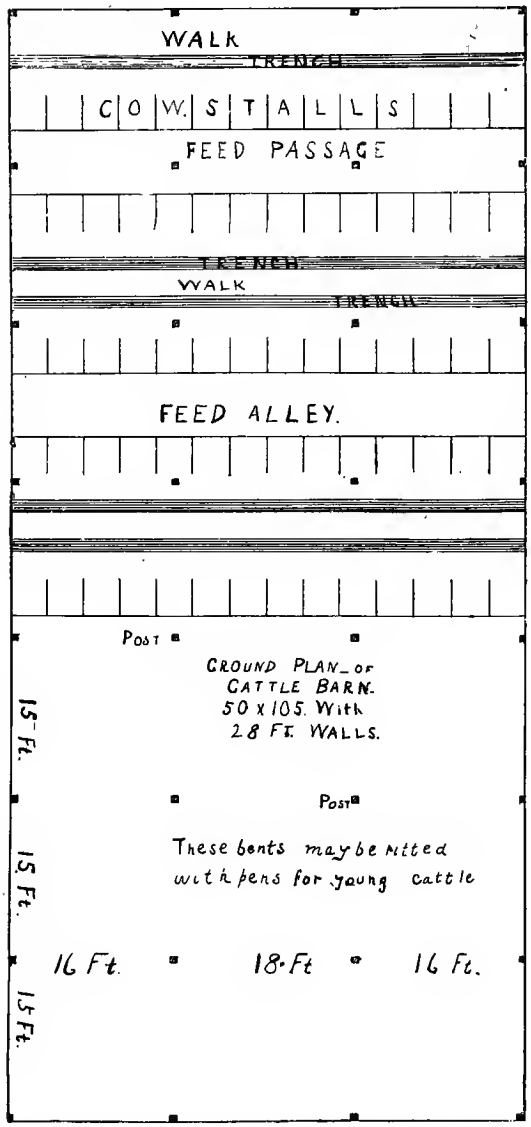


FIG. 78—AN OPEN CENTER CATTLE BARN (GROUND PLAN).

Very thorough ventilation should be provided in so large a barn where so many animals are confined. The hay chutes provide quite well to carry off the vitiated air but provision should be made for a fresh in-flow. The bents are spaced 15′ apart because that distance fits the stalls. If the lumber must be bought it would be better to use 16′ spaces, making a wider feed alley, as odd lengths are not kept in stock. This would make the length of the barn 112′.

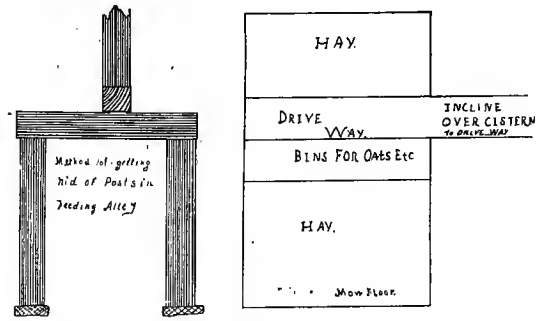


FIG. 79—AN OPEN CENTER CATTLE BARN (DETAILS).

Fig. 79 shows the floor. The incline of the driveway is built over a cistern which receives its supply of water from the roof. The oats and ground feed may be spouted from the bins to two feed alleys. Distribution of the ground feed may be made by means of the small cart pushed by

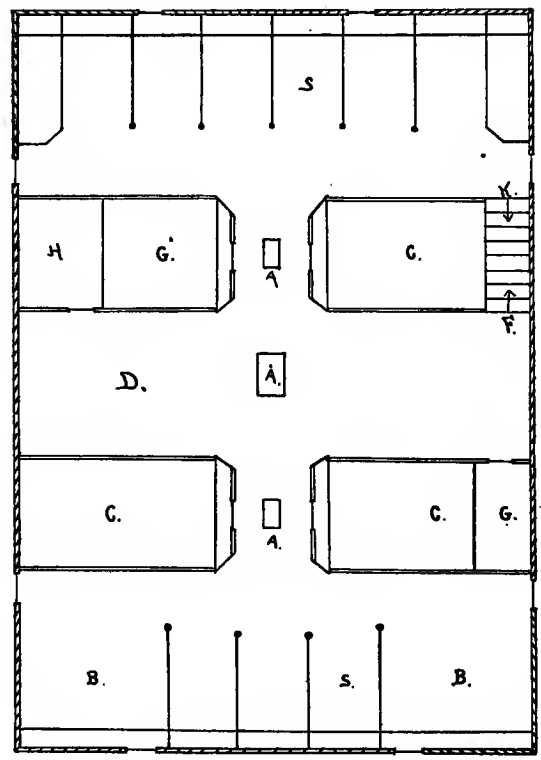


FIG. 80—MISSOURI BARN PLAN.

hand from which may be measured the rations that each animal is to receive. Fig. 79 also illustrates the method of keeping the joists from being in the way of the feed alleys. The location of the stalls in the basement should be made with

accuracy before the building is erected, so that nothing will be in the way when all is done. If built in joist frame this barn can be completed in good shape and fitted with stalls for from $1,000 to $1,200.

A MISSOURI BARN PLAN.

The cattle barn shown in Fig. 80 was built by James A. Barrett of Missouri. The length is 52′; width, 36′; 9′ and 16′ posts are used. The timbers are 8″ x 8″ and 8″ x 10″. An 8′ x 26′ self-feeder is placed in the basement. The chutes A and the octagon ends of the cribs empty into the self-feeder. The barn has a capacity of 25 tons of hay, 1,500 bushels of corn and 500 bushels of oats. Nine single and two box-stalls afford ample stabling quarters. Forty head of cattle find comfortable quarters in the basement. Diagram G represents oat bins; C corn cribs; B the box-stalls (which are 10½′ x 12′); S single stalls 5′; D a 10′ driveway; H harness-room; K and F stairways to the hay mow and basement respectively. At either end of the row of single stalls shown at the top of Fig. 80 chutes are placed for throwing hay into the basement. This barn was built at a cost of $1,750.

A CATTLE FEEDING BARN.

A convenient and comparatively cheap barn in which to grow "baby beef" in the Corn-belt may

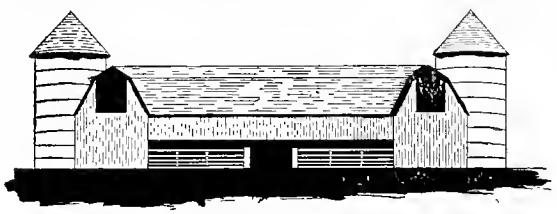


FIG. 81—A CATTLE FEEDING BARN (ELEVATION).

be constructed from the general description and plans following:

To get best results among average cattle and in a climate like that of the Corn-belt the animals should run loose in a rather small yard, with shelter from wind and storm. It is with a view of meeting this requirement that the enclosed yard shown in Fig. 81 is provided with a shed on three sides, 8′ in the clear and with hay loft above. There is a manger running along the outside of the shed in which may be fed hay or silage. Hay is thrown in this directly from the mow through a slit in the floor and it may be boarded up to make a continuous chute open at the bottom through which the cattle draw their hay. The mow is 7′ to the eaves and over 18′ to the peak, allowing the use of horse forks for filling with hay. While it does not hold a very great amount of hay, it will hold an entire rick and the design is to draw during good weather a rick at a time and stow it away in the dry. The sheds and yard are large enough for about 125 head of yearling steers.

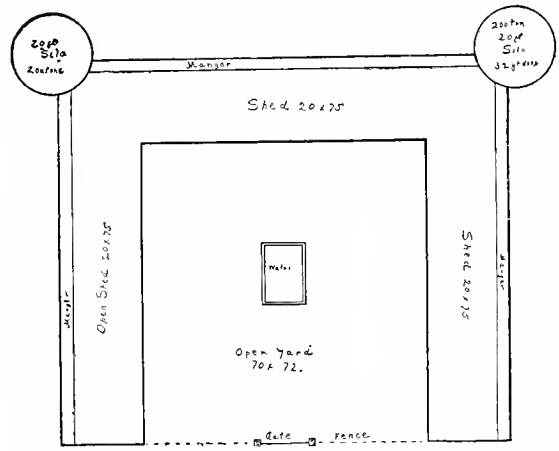


FIG. 82—A CATTLE FEEDING BARN (FLOOR PLAN).

Two silos are provided having a capacity of more than 200 tons each. The doors for emptying are inside the sheds and there may be an overhead track carrying a large box along the line of

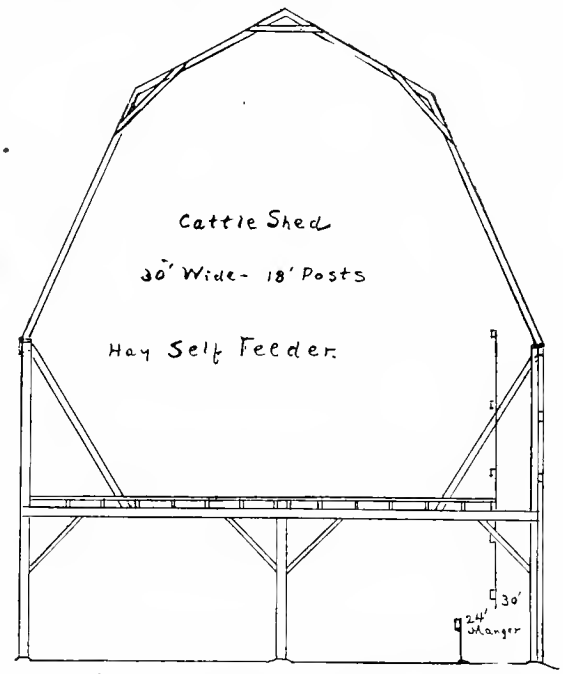


FIG. 83—A CATTLE FEEDING BARN (CROSS SECTION).

the manger, thus making feeding easy and rapid. In the yard (Fig. 82) may be provided open boxes for feeding ear corn or shock corn when desired. As this yard is not very large it might be expedient in many cases to cement the entire

bottom and save mud and waste of manure. Sufficient corn should be fed on the stalk to bed the yard thoroughly and keep it dry and clean. A cement tank affords water for the cattle. Eave troughs carry away the drip from the eaves. Modern tin generally lasts about five years and good galvanized iron makes a better trough.

Forty acres of corn in a favorable season will a little more than fill the silos. There is silage enough in the two silos to feed 175 calves (yearlings) for six months, provided they are fed at the rate of 25 pounds per head per day. If there is a little silage left over until summer it can be used to advantage in supplementing pastures, which often are short during a part of that season.

The cross section of the frame (Fig. 83) shows a building 30′ wide, which is preferable to one of less width. With the hay self-feeder in place with a width of 30′, a height of posts of 18′, with long rafters 16′ and short rafters 10′ enclosing a court 80′ in diameter the barn will hold nearly 300 tons of hay. The self-feeder is shown in cross section (Fig. 83); the continuous chute is 30″ wide, the manger 24″ out from that, the chute reaching to within 6″ of the top level of the manger. Doors in the chute admit of hay being thrown in from any level. Strong feed-racks 3½′ x 8′ that can be set where convenience dictates and readily removed on occasion are preferred to permanent mangers. The side opposite the hay-feeder and next to the enclosed yard is open except that gates may be hung so that cattle, when putting in silage for instance, can be shut into the yard.

A BARN FOR FEEDING CATTLE LOOSE.

There is a demand for cheap barns in which to store forage and feed to cattle below running loose. The design submitted (Figs. 84 and 85) has several good features. Hay stored above is thrown through chutes into the central feeding alley, and thence placed in two long mangers, in which grain may also be fed. The openings may be at the ends or sides and wagons will be driven through to remove the manure.

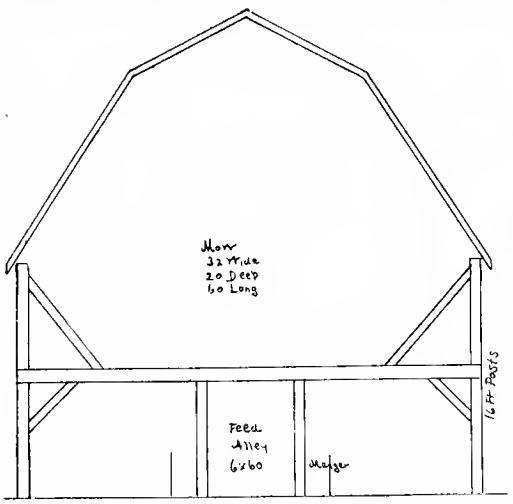


FIG. 84—A BARN FOR FEEDING CATTLE LOOSE (ELEVATION).

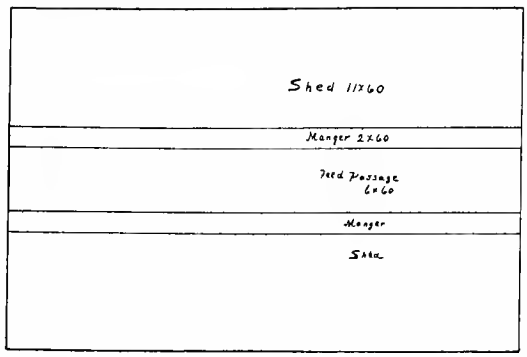


FIG. 85—A BARN FOR FEEDING CATTLE LOOSE (GROUND PLAN).

This building may be of any convenient length, or may enclose three sides of a square open to the south in which cattle will be sheltered. It is all of joist frame construction, without sills or wooden floor. The floor is hard clay, which is as good as anything where cattle run loose. The barn has a hay track in the peak and hay is taken in at one end of barn.

AN IOWA STEER BARN.

H. J. Hess' Iowa barn shown in Figs. 86 and 87 is 60′ x 80′ with 14′ outside posts. It was built for feeding steers and will accommodate more than 100 head besides 160 tons of hay. The first

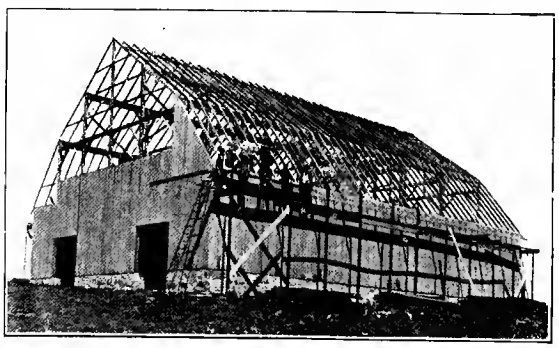


FIG. 86—AN IOWA STEER BARN (CONSTRUCTION).

floor or basement is one large enclosure with a driveway running through lengthways. This driveway is wide enough to admit a team and manure spreader to pass through the barn.

The mow floor is supported by posts which stand upon cut stone caps 12″ x 14″, and these caps rest upon concrete bases 18″ x 18″ and 24″

deep. In making the concrete bases (see Fig. 87) holes were dug a little more than 2′ deep and into each was placed an empty cement barrel having about 12″ of it sawed off and the head taken out; the concrete was then tamped thor-

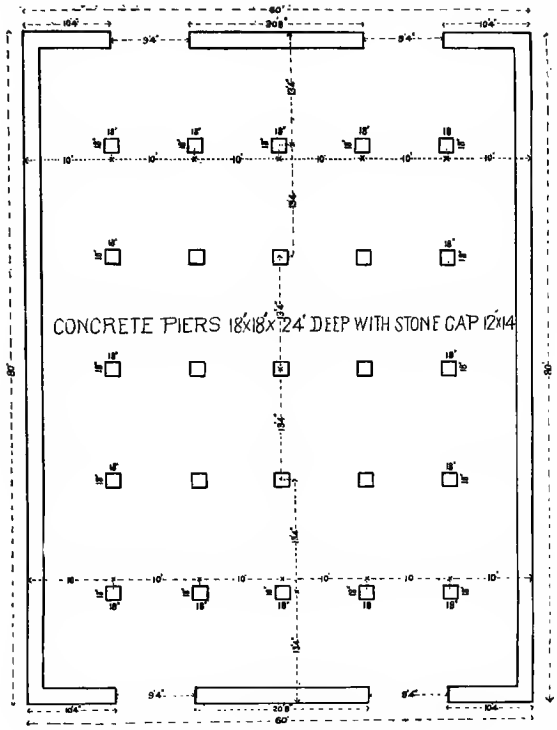


FIG. 87—AN IOWA STEER BARN (BASEMENT PLAN).

oughly in these barrels and when it became hard the hoops on the barrels were cut and the staves removed, leaving a round concrete pier on which to lay the stone caps.

The outside wall of the barn was made of stones (boulders) laid in cement. It is 3½′ high,

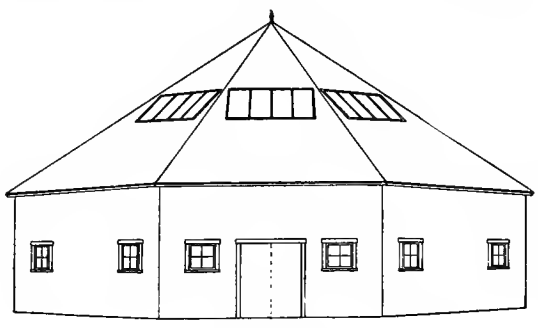


FIG. 88—CATTLE SALE BARN.

3′ wide at the base and 2′ wide on top. About 18″ of it is in the ground. From the ground floor to the mow floor is 10′; this gives the cattle plenty of room. The second floor or hay mow will hold about 160 tons of hay, which is fed through six chutes, three on each side of the barn, placed 10′ on each side of the center of the mow thus making the two rows of chutes 20′ apart. These chutes are cone-shaped, larger at the top than at the bottom, and feed into a manger below. They extend to the roof and hay may be pitched into them at any point.

The barn is built of 2″ pine stuff; there is not a solid timber in it. All the posts are continuous from the cap stones to the roof, being spliced with heavy spikes. The siding is 8″ dressed and matched. The large hay room or mow was made possible by constructing the hip roof. Hay is taken in by slings. The barn cost $2,000.

A CATTLE SALE BARN.

Designed for use as a barn in which to hold auction sales of pedigreed beef cattle, this

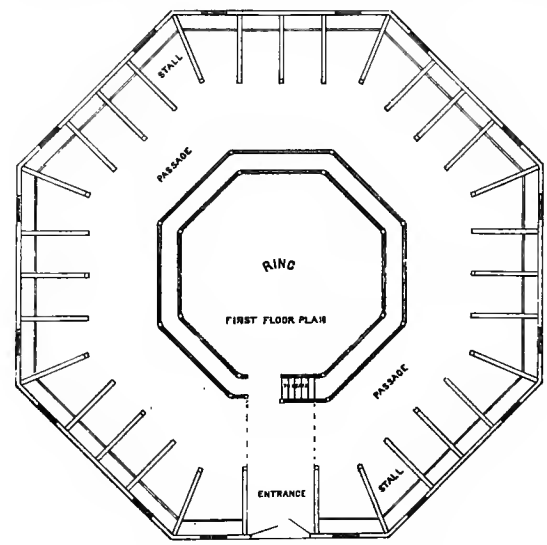


FIG. 89—CATTLE SALE BARN.

building (see Fig. 88) seats 600 people (Fig. 90) and has stalls for 30 cattle (Fig. 89). As it is not meant regularly to accomodate cattle no provision is made for the storage of hay or grain, which will be received at the barn in small amounts, the hay in bales, and stored temporarily in the passage. The seats are over the cattle stalls and are arranged in a regular incline, giving every visitor a good view of the sale-ring, which is 24′ in diameter. The building is 25′ long on each side, of octagon shape, and 16′ high at the eaves. Light to the sale-ring is afforded by sky lights in the roof. The stalls are well lighted by two windows in each side. The building is very economical of material and space and

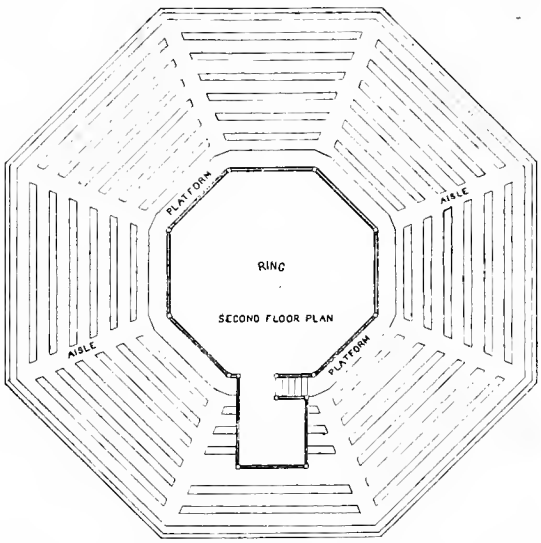


FIG. 90—CATTLE SALE BARN.

may be built at very moderate expense or if desired made quite elaborate.

A CATTLE SALE PAVILION.

The cattle sale pavilion shown in Fig. 91 cost about $1,000. It was built by Stow & Ginrich, proprietors of the Clover Wave Hereford Farm in Iowa. This barn is 60′ in diameter and 50′ high. The sills are made of boards 1″ x 6″ green native lumber six boards thick, placed on edge on the foundation, making a sill 6″ x 6″. The studding is of pine 2″ x 6″ and 16′ long. The girders are 1″ x 4″ native lumber bent around the outside of the studding. The boards are double and put on so as to break the joints. This makes a 2″ x 4″ girder. The plates are made of 1″ x 6″ in the same manner; the rafters are of pine 2″ x 6″ and 18′ long to purlin plate, which is made of 1″ x 6″ native lumber. The upper rafters are same length, reaching up to the top plate which forms the base of the cupola. The cupola has 2″ x 4″ studding 6′ long and at the top is another plate made of native lumber 1″ x 4″. The siding is pine 8″ boards; the sheathing is 1″x3″ native lumber except on cupola, which is 1″ x 2″, so as to bend more easily. About 35,000 shingles were required to cover it. The doors are hung on rollers and are curved the same as the side of the barn. The roof is cone-shaped and is self-supporting. The hay capacity of the mow is 150 tons and the ground floor will accommodate 32 head of large cattle. In the center of the barn is a sale-ring 30′ in diameter and around the side of the building are 20 large stalls, as shown in Fig. 92.

Fig. 92 shows the arrangement of the ground

FIG. 91—CATTLE SALE PAVILION (ELEVATION).

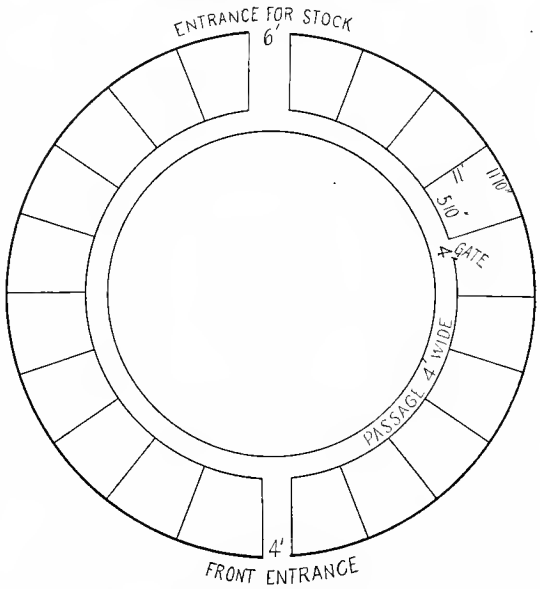


FIG. 92—CATTLE SALE PAVILION (PLAN).

floor. The entrance for stock is 6′ wide and the front entrance 4′ wide. The aisle is 4′ wide. Gates opening into the stalls are 4′ wide and are made to fasten across the aisle when open for convenience in handling stock. There are 12 feed boxes around the circle in the center for that number of large cattle or quite a number of calves could be put in loose.

HORSE BARNS AND STABLES.

On the farm a general style and principle may be employed in building housing for horses and cattle. Preceding pages in this work may be taken as providing horse shelter for many farms, but when it comes to building stables exclusively designed for horses special plans must be followed. The ceaseless activity of the horse, young and old, must be reckoned with from first to last and this necessitates a solidity of structure in detail which need not be observed in the erection of ordinary farm buildings.

A fairly large barn is desirable on account of the economy of construction involved. Box-stalls must be provided for stallions and for mares and foals. The walls of every box should be made so that they slope inward for the first four feet of their height, being at the ground point one foot inside the perpendicular of the wall. This prevents a horse from being cast or rubbing his tail or bruising his hocks. Doors from each box should open to the outside. This insures a ready egress for the animals in case of fire and an easy way to clean out the boxes day by day. Once the manure is thrown on the outside it may be drawn away and spread on the grasslands or fields at once and its utmost benefit secured to the farm. A gravel or stone road should be laid entirely around a stable with these outside doors. The inside space of a large barn must necessarily contain boxes which cannot open to the outside. These should communicate with large doors by broad alleyways.

Convenient space should always be reserved on the ground floor for a feed-mixing room and hay may be delivered to the manger in each box directly by chutes or to convenient spots in the alleyways. If each box is equipped with a chute a great waste of hay is almost certain, as the tendency will be to save time and work by filling the chute full and allowing the horse to stand to hay all the time. This is one of the most costly and most unnecessary wastes on the American farm.

Loft-room should be very ample. To this end the open form of construction in the roof has been found to be the most satisfactory. Large bins for keeping grain and bran should also be provided as nearly rat-proof as possible and connected with the feed-room below by spouts. In the comb of the roof in large barns there should be a complete system of tracks for hay forks or slings, admitting of the filling of the loft from each end.

Partitions between box-stalls for the first five or six feet from the ground upward must be very strong and substantial. Above this, iron rods ½″ thick or heavy wire netting should be used. Horses love company and if closely confined but unable to see each other they are likely to get restless and contract the bad habit of pawing. These iron rods should be set top and bottom in oak or other hardwood timber 2″ x 4″ in size and the edges should always be rounded off with the plane. It seems likely that partitions of concrete will come into great favor. For the mangers iron is preferred by some and wood by others, but when wood is used it will be found that the short and crabbed grain of the dry beech tree is the best. The perpetual gnawing to which most wooden mangers are subjected, chiefly by colts, makes little impression on beech wood. Some prefer to leave nothing in the box at all on which the horse may fix his teeth. A portable feed-box, placed inside the door and removed when the feed is finished, and hay fed on the floor are preferred by many of the best breeders and horsemen of the day, but the feeding of long hay on the floor is wasteful. It is better to provide a manger bound with tin or sheet iron to prevent gnawing. The best flooring for the boxes is a hard clay.

Light and air are essential in all horse barns. Windows should be easily opened and each one should be fitted with a wire screen so that in summer the flies may be kept out. Doors to the outside should be in two parts, the lower half about 5′ high and the upper smaller, its place to be taken in hot weather by strong wire screened netting. This must be protected by a frame work of hard wood bars. With windows and doors thus opened and screened, the horses will be cool and comfortable as possible in hot weather. Electrically driven fans of course may be installed, but they are not common.

If the design is to build a barn which may be used partially for breeding horses and also for driving horses, a series of standing stalls should be arranged. These may be floored with pine or other planks for two-thirds of their length, allowing the fore feet to rest on a clay floor. A well-built harness-room fitted with cases in which the leather goods may be shut up air-

ght is desired. The ammonia arising from the bles where horses are kept is very destructive to leather and the varnish on carriages. For this reason the carriage-house should be shut off om the section in which the horses are kept. Glass doors should be used in the harness cases in order that the condition of the leather may be readily noted.

Ventilation is one of the essentials in a stable. There must be air shafts from the lower story leading to slatted cupolas on the comb of the roof. If a reasonable amount of attention is paid to the location of the windows and doors there need not be any trouble as to the supply of necessary fresh air, but ample shafts to carry off the heated foul air must be provided.

Generally it is well to devote barns to one distinct use or another but very satisfactory composite structures may be built. If there are several stallions, usually the most valuable animals on the farm to be cared for, it is best to give them a stable to themselves, and in such a case, more than in any other, doors should open to the outside. Fire is an ever-present possibility and the horse is the most stupid of all the domestic animals when fire is to be fought. The utmost celerity of action is necessary, and any plan of construction which does not coincide with that is faulty.

The method of watering is rather unimportant so long as the water is pure. Perhaps as good a way as any to water horses is the old-fashioned one of carrying it to them in buckets. A hydrant in the barn or a convenient pump are preferred by many owners to a system of water troughs in the stalls which must be cleansed daily or become foul from the dropping of food in them. A watering trough of cement, galvanized iron or wood, conveniently placed in the stable yard or inside the stable, is perhaps as economical of time and labor as the individual troughs in each stall, when the trouble of keeping the latter clean is considered. Fresh cool water in the summer and tempered water in the winter add much to the comfort and thrift of the horse. Water fresh from a well or hydrant meets both conditions. When horses are watered from an outside trough in winter a tank heater is necessary to keep it free from ice. In all cases the water should be close at hand.

THE STABLING AT OAKLAWN FARM.

When horses were first kept at Oaklawn 35 years ago the big basement barn was the main structure on the premises made so famous by the late Mark W. Dunham, DuPage Co., Ill. It is still a central figure. Observe this barn in the diagram showing the stabling on this farm. See also the engraving constituting the frontispiece of this volume. There are three stories in it—the stone basement filled with box-stalls only, the floor or "show barn" on the ground level also filled with box-stalls, and the loft above for the storage of hay and grain. This barn stretches its length east and west. The barn where the driving horses are kept adjoins it on the west, but that in its width extends some 12′ or more to the southward, which can not be seen in the picture. Room is provided in single stalls on the upper ground level for 12 driving horses. Still to the west of this driving barn is the coach house with room for 20 vehicles of all sizes from the barouche to the run-about or single speeding buggy. Above the driving horse barn and the coach house are the lofts where the seedcorn and other similar supplies are stored in winter—a fire being kept in the coach house in cold weather. Below these two divisions are the root-cellars, solid stone walled pits where hundreds of tons of carrots, sugar beets and mangels are stored each fall for the winter consumption of the 600 or more horses, young and old, on the farm.

Observe now the convenience with which the manure is handled from these two barns. The ground-level floor contains the 12 drivers and more stallions in boxes in the show barn. The manure is thrust from properly covered apertures in the walls to the ground below on the level of the floor of the basement and is there joined by the manure from the boxes therein. It is all thrown in piles on a stone causeway and removed daily by a teamster whose sole duty it is in and out of season to keep this litter spread out on the grasslands.

Adjoining the root-cellars on the lower level and stretching at right angles to the basement come the sheds, one story structures, running first from the root-cellar south, then east and then north to meet the "running shed," a vaulted structure 300′ long by 120′ wide used for showing stallions to customers in cold or stormy weather. This running shed stretches its length east and west and is advantageously used in summer for the storage of grain and hay, loads of sheaf grain or hay over night, or corn fodder in the fall, the only requisite being that it shall be free for showing and exercising in the winter selling season.

On the opposite side of this big shed and running northward is a row of box-stalls, terminating in a double-stalled barn near the hedge, as marked in plat, Fig. 92a. About half-way between the running shed and the terminal barn as here described a row of stallion boxes runs eastward to the west line of Barn No. 5. There are double boxes in this row, the doors facing north and south. The manure from these is thrown in piles at the doors each day and removed almost

as soon as thrown out. Above all these boxes are lofts for the storage of hay and grain.

Barn No. 5 is used altogether for the housing of colts. It stretches again east and west and along its north side there is an alleyway from which feed may be placed in the mangers. The boxes in this very large stable are spacious and hold from three to ten foals or yearlings and 100 head may safely be housed in it. Spouts bring oats from large bins in the loft to a feed-room in the extreme west end of the building and hay is run down convenient chutes at intervals throughout its length. No. 5 and the running shed terminate about on a line at their eastmost extremities. A court is formed within the two, the west end being encompassed by the row of boxes and the exercising of horses may be done in this court at any time.

grown and fed at Oaklawn, and the excellence of the grain crops on this farm prove the efficacy of this method of utilizing the vast quantities of horse manure which must be handled each season. In addition, after the fertilizing elements have had due opportunity to be dissolved and sink into the earth, the unrotted straw is carefully raked up again when dry, and carted back to the barns, where it is stacked and made to do duty as bedding once more.

In the second story of No. 6 is a vast amount of hay and grain storage, that portion of the barn having been built with an open center with a view of affording the utmost room for this purpose. Large storage of oats and bran is also provided, the necessary bags of these products being swung to their place by means of an ingenious system of ropes and pulleys which enables the

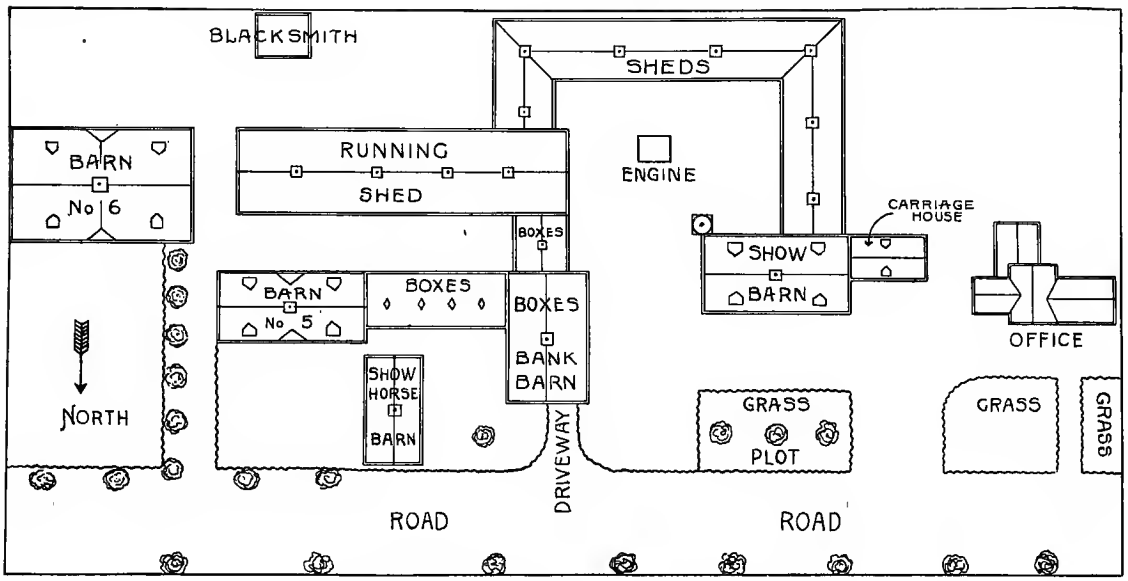


FIG. 92a—GENERAL ARRANGEMENT OF BARNS AT OAKLAWN.

The big barn farthest east is No. 6. It is the largest and best barn in Kane county that is devoted exclusively to the keeping of commercial horses. It is 112′ long, 62′ wide and 54′ high from sill to peak of roof, the posts being 28′ high. Storage capacity for over 400 tons loose hay is afforded. Main timbers are 10″ x 12″ and 32′ long. In it on the ground floor there are box-stalls only with accommodations for something like 28 stallions. All but a very few of the stalls open to the outside and the few in the center have access to the outside by broad alleyways. The manure here is thrown to the outside where hard gravel roads have been made and, as in all other barns, is removed each day or twice a day as the case may be, to be at once spread on the land most requiring it. The enormous crops of hay work to be easily and quickly done by horse power. Similarly the hay floor is filled from the wagons by means of slings, harpoons and grip forks, the tracks being laid in the apex of the roof with the object of filling the loft from either or both ends, as the case may be, and at the same time from both if desired. It may be said that this barn was built from plans approved beforehand by the insurance companies with which the risk was placed.

Directly south of about the middle of the running shed and well down the hill is the blacksmith shop, safely removed from both that shed and the single story sheds which run north and south to meet it at its westmost end. In the middle of the quadrangle formed by the root-cellars, the single story sheds and the basement

barn stands the engine which pumps the water for the entire farm, boils feed, grinds grain, shreds fodder, saws wood and the like.

In each barn there are several hydrants. The well which is driven in the center of the quadrangle described grants an abundance of the purest water, which is pumped by the engine to a reservoir back of Oaklawn House on the highest part of the farm. From there the water is distributed to every barn and field by means of pipes sunk 6′ to 8′ in the ground. The supply is never-failing, but is reinforced by a multiplicity of windmills and wells in the pastures somewhat remote from the main engine. Another well, fitted with a powerful windmill, is placed at the southeast corner of the show barn, as shown in the picture, Fig. 92a, to aid in maintaining a full supply in times of drouth. In addition to supplying the stables and fields with water the engine and main well are also made to supply Oaklawn House and other smaller dwellings on the farm.

Such is the Oaklawn plant. Its convenience for the purpose for which it is used is beyond criticism. The small barn, where the show and breeding horses are kept for the most part, is situated by itself and about half way from the double-stalled barn to No. 5. It extends north and south nearly to the main road and is in itself a model for its uses. It has limited hay storage above the boxes and plenty of room for grain, while the appliances for mixing feed on the main floor are thoroughly modern.

The same may be said of all the other barns. The object has been in arranging the entire plant to make the steps taken by the grooms the fewest possible under the circumstances. The hay may be dropped just where wanted and the grain spouted to its place for mixing. The walls of the box-stalls are all fitted with small sliding doors opening into the mangers so that the grooms need not enter the boxes when feeding the horses and most of the boxes are also fitted with water troughs into which a supply of water may be turned at will or in which one may be retained permanently by means of ball and float valves. The buildings are all painted a dark rich red, the trimmings being white. The mares and foals are kept on other parts of the farm which cannot be seen in the engraving to which this refers.

BARN FOR LIGHT HORSES.

A very complete and convenient horse barn was built several years ago in Pennsylvania for the stabling of light horses. The diagrams (Figs. 93 and 94) afford a capital idea of the front elevation and the ground plan of the structure, which is very handsome in its architecture, economical in its construction and admirable in its arrangement.

The dimensions and capacity appear in figures on the diagrams. The grooms have very comfortable steam-heated quarters in the second story, over the harness and wash-rooms, and there is ample reserve room over the left wing of the front of the barn. A feature not shown in the diagram is the half-story over the entire circle of boxes, which affords storage for a large quantity of hay that can be mowed away and pitched out at various convenient points. Most of the Eastern light horse-breeding establishments are equipped either with stables in which boxes are arranged around a big covered area or else with large riding or training schools, in both of which large and costly roofs are needed. Provision has been made in this case for such a training school without the expense of the roof by allowing the roof of the boxes to project over the inner circular court twelve feet, thus affording a covered track under shelter the entire distance around without a single post. The drain-pipes from the eaves are hinged, so that they may be hooked up to the inner side of the roof out of the way, thus giving an arena 119′ in diameter, with 12′ under cover all around the outer circle. The inner circle on the diagram is an imaginary line, designed to show the distance that the roof projects over the court. The entire court is laid in rolled cinders and has a slight fall toward the center for drainage. All doors opening onto it may be tightly closed, thus affording as fine a training and exercising arena as could be

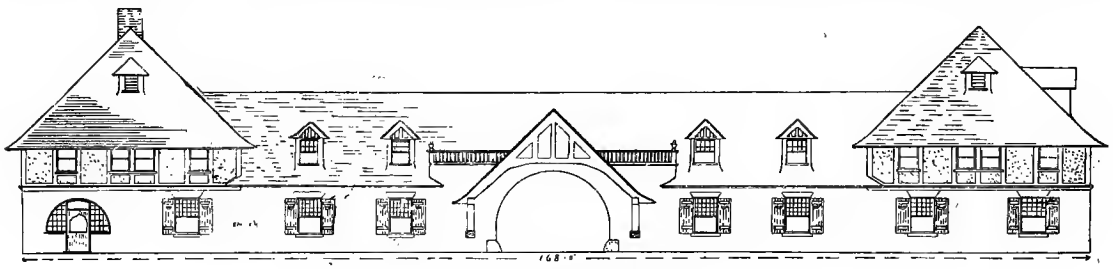


FIG. 93—BARN FOR LIGHT HORSES (FRONT ELEVATION).

desired in clear weather, while it must be a very wild day that will interfere with work on the 12′ track under shelter. Twenty-eight box-stalls, each 10′ x 12′, give luxurious quarters to the horses.

A KENTUCKY COACH AND STALLION BARN.

J. B. Haggin's combination coach and stallion barn at the famous Elmendorf farm is in keeping with the substantial buildings at that great breeding establishment. It is constructed of stone and brick, the upper part of the building being of the latter material, while over all is a tile roof, making the structure as nearly fireproof as it is possible to make such a building (See Fig. 94a.)

Mr. Haggin had in mind the great value of his stallions when he ordered the barn built. As a stallion barn it is a fairly large structure, the main barn having two wings, one on each side. In both the main structure and the wings are box-stalls for the coach horses and the valuable stallions which form the nucleus of his Thoroughbred stud. The partitions between the box-stalls and the main barn are of brick (Fig. 94b) so that no ordinary fire would be able to do any great amount of damage to the animals contained therein. On one side of the main barn are open stalls for the coach horses. In addition to the doors to the box-stalls from the interior are small windows and on the exterior of the stalls are windows placed well up. They afford plenty of light while not allowing the stallions a view of what is going on outside.

In the center of the stallion barn are large ventilators, while the wings are ventilated with circular ventilators made of galvanized iron. In

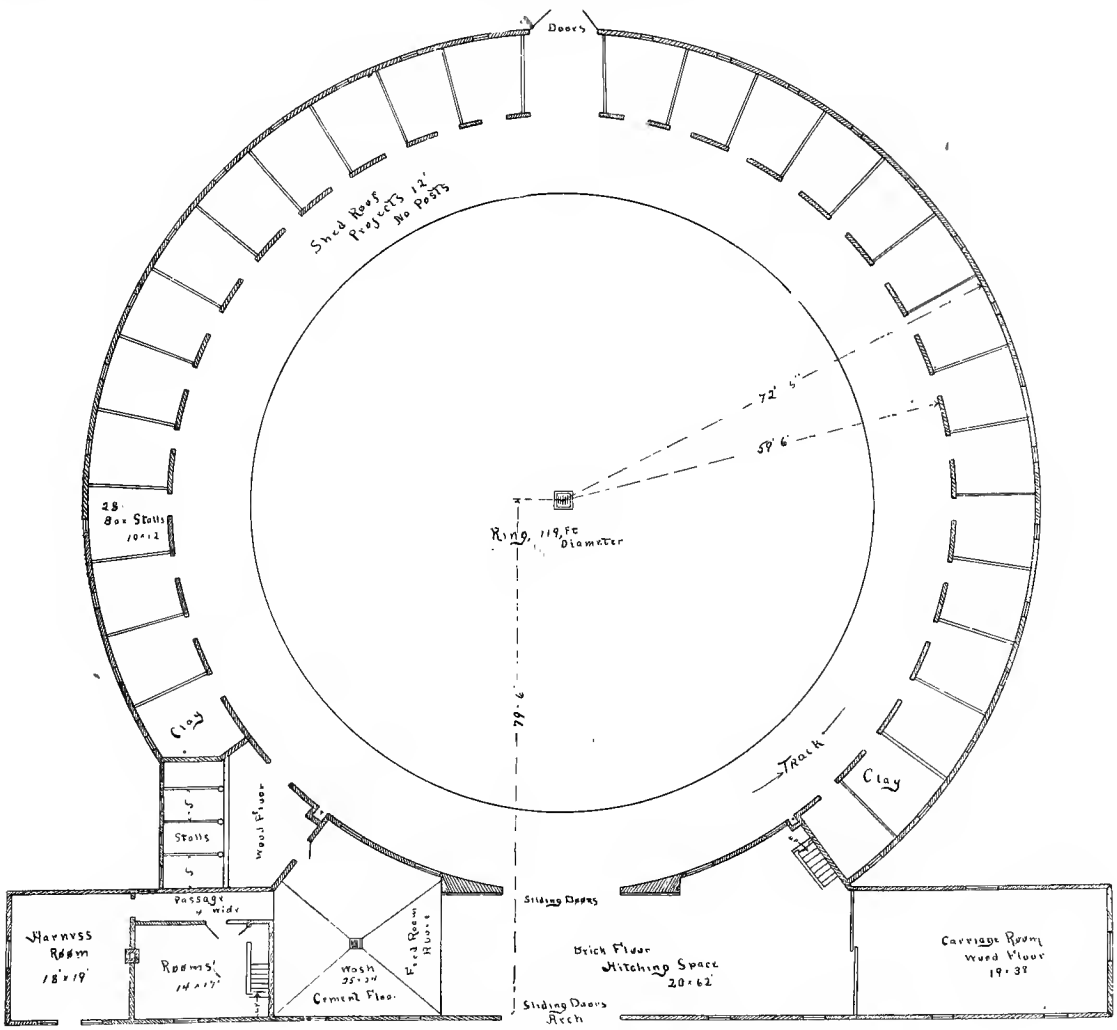


FIG. 94—BARN FOR LIGHT HORSES (GROUND PLAN).

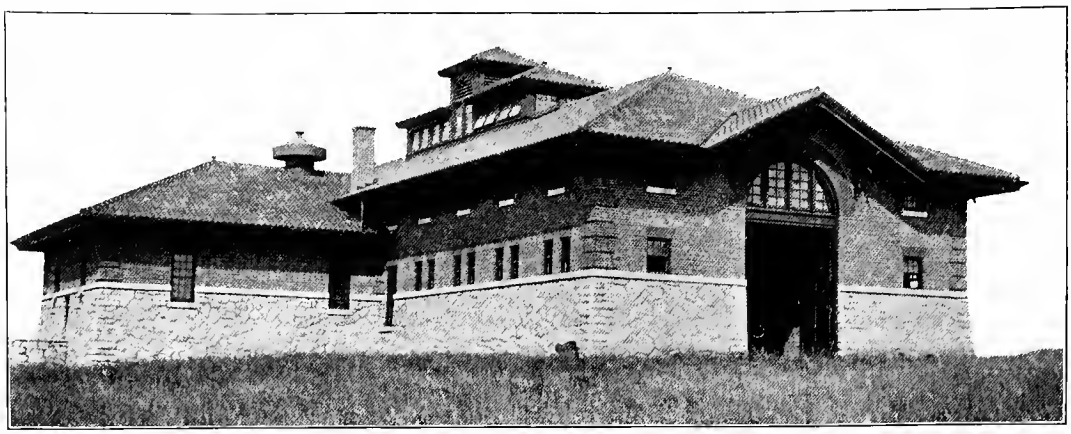


FIG. 94a—KENTUCKY COACH AND STALLION BARN (ELEVATION).

the upper barn is room for the feed, hay and grain.

As a model of fireproof construction the Haggin coach and stallion barn is considered the best around Lexington, Ky.

A MONTANA HORSE BARN.

The dimensions of this barn, shown in Fig. 95, are 36′ x 84′; posts are 12′ apart; two horses are put in a stall; the stalls are 12′ wide, facing the sides of the barn. There are several advantages in this arrangement: horses are easily put in and taken out, easily groomed, harness may be hung on hooks suspended by pulleys right behind them and drawn up out of the way. Besides with such wide stalls it is easy to put feed in their mangers even when the horses are in place. The transverse driveway is to be used only when hay is put in; at other times it is closed with swinging partitions and made into two box-stalls, which are very useful in any stable. This stable may be equipped with an overhead track and carrier for taking out the manure. In the mow floor there should be bins for oats or corn, to be spouted

FIG. 94b—KENTUCKY COACH AND STALLION BARN (INTERIOR).

down beside the posts, and filled by a horse-hoist from the central driveway. The frame is all joist, with a self-supporting curb roof.

A MODERN STALLION BARN.

Plans for an admirable barn (Fig. 96) for stallions recently built in Northern Illinois are herewith given.

The main barn has 18′ studding. The lower story is 9′ high, covered outside with drop-siding, galvanized iron, molded gutters, red cedar shin-

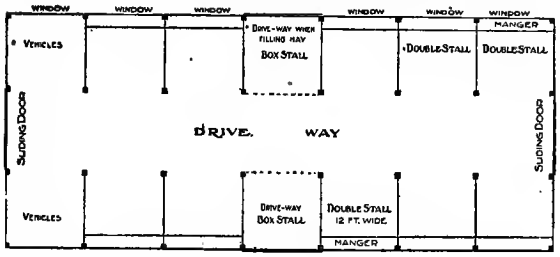


FIG. 95—MONTANA HORSE BARN (GROUND PLAN).

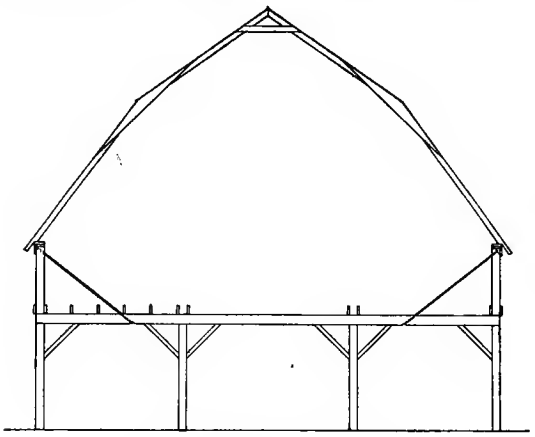
gles, lined throughout—the lower 4½′ with 2″ x 12″ dressed lumber, above 4½′ with matched fencing. Partitions between stalls are 7′ high of 2″ x 10″ oak the lower 4½′, and 2½′ of 2″ x 12″ hemlock. Alley partitions are 6′ high of 2″ x 12″ hemlock; wall studding 2″ x 6″; floor joists 2″ x 12″; rafters 2″ x 8″; supporting timbers 4″ x 6″ and 6″ x 6″. Stall doors are of 1″ x 6″ matched fencing and double. The wing is one story high, 36′ x 110′; it has a row of box-stalls opening into the exercising room. The latter is lighted by windows 3′ high, set on upper end of rafters over box-stalls and under the upper end of rafters over exercising room, giving perfect light and ventilation. An office and carriage-room are in main building; men's sleeping room over the office. The stable was built at a cost of about $2,600.

A HORSE BARN WITHOUT CROSS TIES.

This horse barn possesses many excellent features, among them being the minimum of cost for accommodations secured, economy space, convenience and healthfulness for the occupants. It is built either with joist or solid timber frame (Fig. 97), without cross-ties

FIG. 96—A MODERN STALLION BARN

even purlin plates. The roof is self-supporting, each rafter being so spliced to the one above as to make it virtually one piece and the half of an arch. This arrangement gives ample strength to the roof.



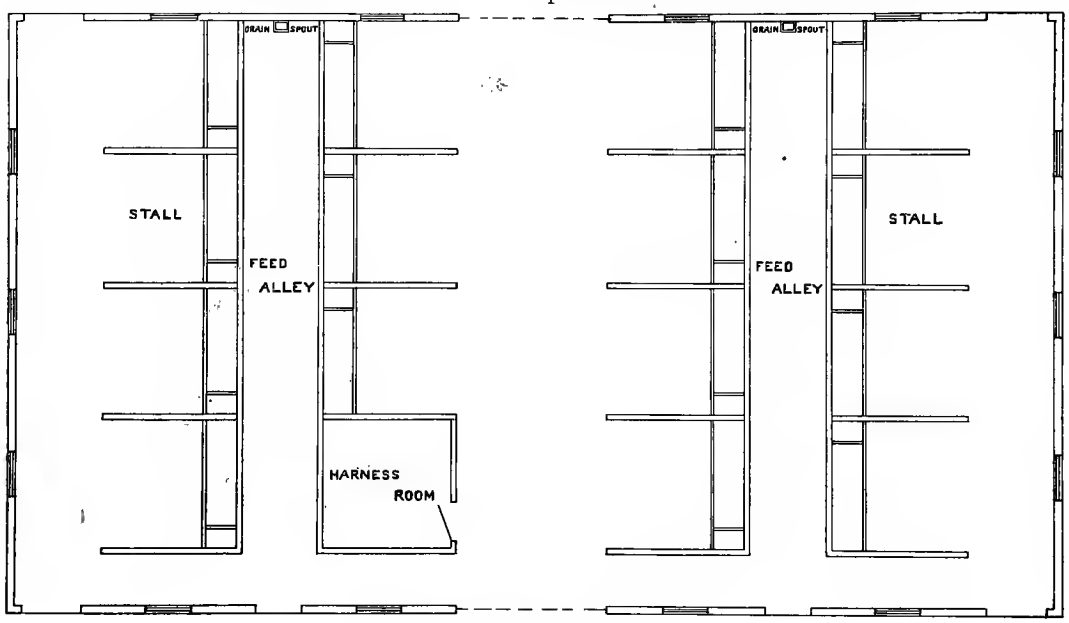
END ELEVATION OF FRAME

FIG. 97—HORSE BARN WITHOUT CROSS-TIES

firmly in place. At the peak there is the collar-beam 1″ x 6″, which adds materially to the rigidity of the frame. The hay track is put on this collar-beam. No floor is used nor sills, the posts resting directly on stone.

The floor is of hard earth. The stalls are double, two horses being put in each. Grain (in bins in the second story) is spouted down to each alleyway and hay chutes reach into the feeding-alleys. These chutes should reach up through the mow nearly to the roof, should be 3½′ square and open on one side. These chutes form very efficient ventilators. There is an alleyway (Fig. 98) that gives access to the central passage where horses are harnessed or hitched to the vehicles. There should be a window to the harness-room, omitted in the drawing, opposite the one in the alley.

Ladders through the hay chutes give access to the mow. Hay is taken in at either end through doors arranged so as to allow the use of slings and the taking in of draughts at any desired height, these doors reaching from the peak down to the floor of the mow. This barn



GROUND PLAN 40X70

FIG. 98—HORSE BARN WITHOUT CROSS-TIES.

In lieu of cross-ties there are ¾″ iron rods running from the plates at the posts to the joist-bearers below. These keep the sides from spreading. The rafters are 2″ x 6″ and join at the ends by butting together. Below the rafters there is a triangular piece of oak about 2′ long cut to fit in the angle. This is firmly nailed. On each side of the joist there is now added a board of some tough wood, 1″ x 12″, which also is nailed

could be easily converted into a cattle barn by putting in cattle stalls where the horse stalls are arranged.

PLAN FOR HORSE BARN.

The plan shown in Fig. 99 is for a barn 36′ x 60′. It will accommodate fourteen horses. By increasing the length 12′ it will accommodate eighteen head. It has two feed-rooms, a safe and

convenient place for harness, two box-stalls and 12 open stalls.

The barn may be sided with 16′ stock boards with battens or with shiplap. By making the eaves higher than 16′ there will be more room for hay, but a barn of the dimensions given will contain all the hay required, as it will hold about 40 tons.

Instead of chutes or the regular mangers to feed hay there is a feedway 3′ wide, with perpendicular sides 3′ high from the floor of the stalls, and it is floored on a level with the top of the sill. A feedway like this is better than mangers or chutes, as it allows a man to pass along the entire length of the barn in front of the horses when feeding; there is absolutely no waste of hay, as the horses stand with their heads over the hay while eating and do not pull it out and drop it under their feet, and the chaff is not constantly falling down in their eyes, as when a manger is used that feeds from above.

The feed-rooms are situated on each side of the driveway and are each divided into two compartments and an entry so as to allow a variety of feed to be kept and to be easy of access.

The barn should be lighted with ten windows on each side, two to each box-stall, two to each feed-room and one in front of each single stall. Common barn sash should be used, having six 8″ x 10″ panes to each sash, a single sash to each window, with the longest way of the sash up and down. They should be put in on top of the girt, about 4′ from the bottom of the sill, and should be arranged to open by sliding to one side.

Feed-rooms should be sided with hard-pine flooring with the smooth side next to the stalls and driveway. Instead of a harness-room hooks can be put up along the sides of the feed-rooms next to the driveway, which will be found to answer as well as a regular harness-room and more convenient, as it will be more accessible.

The box-stalls should be sided perpendicularly, inside and out, from floor to ceiling, with hard-pine flooring, except the front, which can be sided up 4′ high and left open, unless a stallion is to be kept, in which case the front may be finished out to the ceiling with half-inch rods set four inches apart in the top of the partition or the regular box-stall wire work may be used. No manger should be used in the box-stalls, the hay being fed on the floor. None will be wasted unless more is fed than the animal should have.

The floor of the hay mow should be not less than 9′ from the floor of the barn, though 10′ or even 12′ would be better for sanitary reasons. The mow should be floored solid, except over the feedways, which should be left open to throw feed down. The roof should have from one-third to one-half pitch, and should be self-supporting, so as to do away with all cross-ties in the mow. The driveway can be floored with 2″ plank and clay floors used in the stalls, but that and many other minor details must be governed by the individual taste and requirements of the builder. This barn was built for about $1,000.

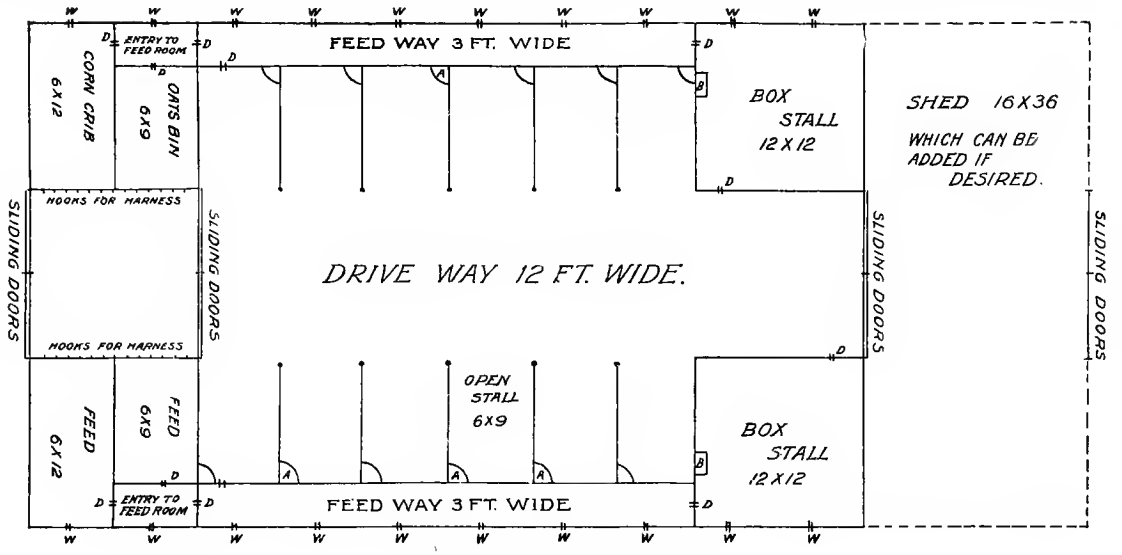


FIG. 99—PLAN FOR HORSE BARN.

A NEBRASKA HORSE BARN.

It will be seen from the accompanying diagram of the ground plan (Fig. 101) that the interior arrangements of this substantially built stallion barn in the main consist of a wide driveway 24′ x 152′, with a row of boxes on either side.

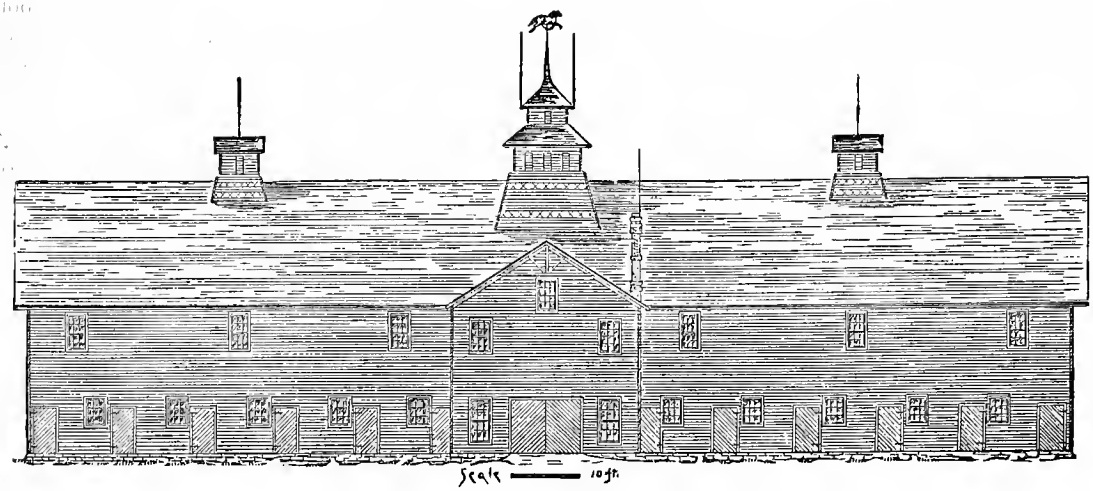


FIG. 100—NEBRASKA HORSE BARN (SIDE ELEVATION).

This driveway affords a place in which to exercise the horses every day in the year, being of such dimensions that they may be taken on a gallop if desired from one end to the other—and all horsemen understand the value of such a place when the inclemency of the weather prevents outdoor exercise.

Another special feature is the construction of the boxes. The partitions between the boxes and abutting on the hall consist of a solid 4″ wall of pine, made of 2″ x 4″ pieces laid like brick, one on top another, with a cap-piece of oak 5′ up. Above this for 3½′ more there is a grating of gas-pipe ⅞″ in size, outside measure, and 4″ apart. To provide means of speedy egress in case of fire there is an outside door to every stall.

The foundation consists of a solid 18″ wall 18″ deep; piers and interior posts are 18″ x 18″ and 3′ deep. The frame is a mortise and tenon; 8″ x 8″ stuff for posts, sills and cross-beams; posts 22′ high. The first floor is of earth and the second floor over boxes is matched flooring, and over hall common boards. The joists are 2″ x 10″; 16″ apart over stalls, 12″ apart over hall. Sides 5½″ patent siding; rafters 2″ x 8″, 2′ apart, with 2″ x 8″ ridge-pole; shingle roof, with eaves projecting 24″. Stall windows have nine lights and slide to one side. The hall and office windows have twelve lights 10″ x 18″, and second floor windows have twelve lights 10″ x 14″. The inside doors are of three thicknesses of ¾″ matched flooring. There is a cellar 9′ deep under feed-

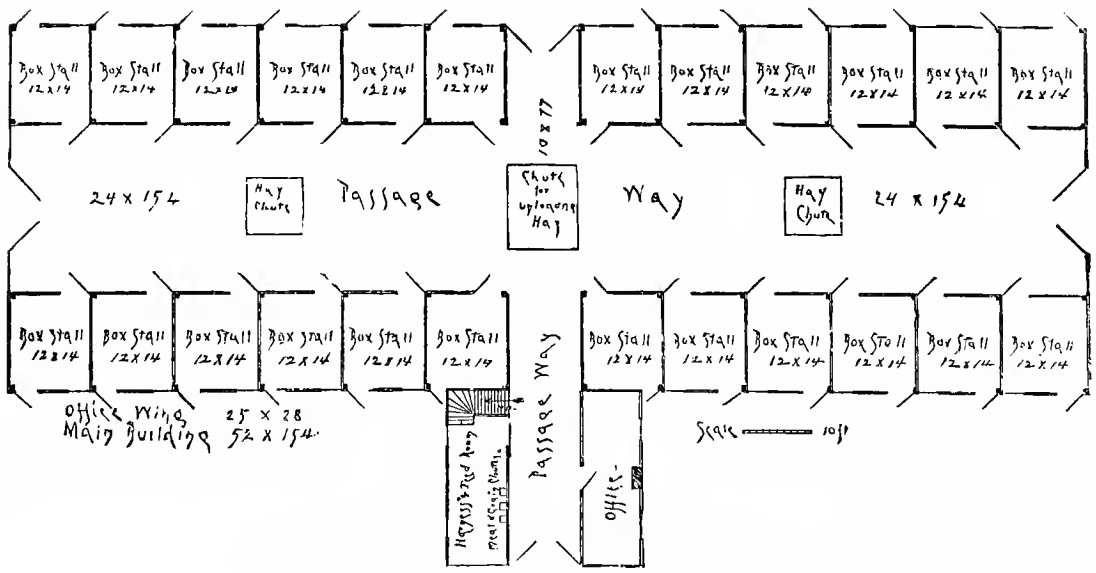


FIG. 101—NEBRASKA HORSE BARN (GROUND PLAN).

room for carrots. The sides and ceiling of office-room are matched ceiling of pine and in the second-floor room laths and plaster. The large ventilator is 10′ x 10′ and handsomely proportioned.

Several years ago the cost of this barn was probably between $8,000 and $9,000. Fig. 100 shows the elevation.

THREE-STORY FARM AND HORSE BARN.

The three-story farm and horse barn shown in Figs. 102, 103 and 104 is 34′ wide and 80′ long, with six double stalls, two single and four box stalls. Though the basement (Fig. 103) cross driveway. Grain is spouted down i small bins at one side of the passage and close on the other side will be found convenient f harness and stable furniture.

As this three-storied barn is narrow it w needful to restrain the height as much as is sa to avoid wrong proportion, so each story wa built 8′ in the clear. With the self-supportin roof ample room for hay storage is secured. Hay

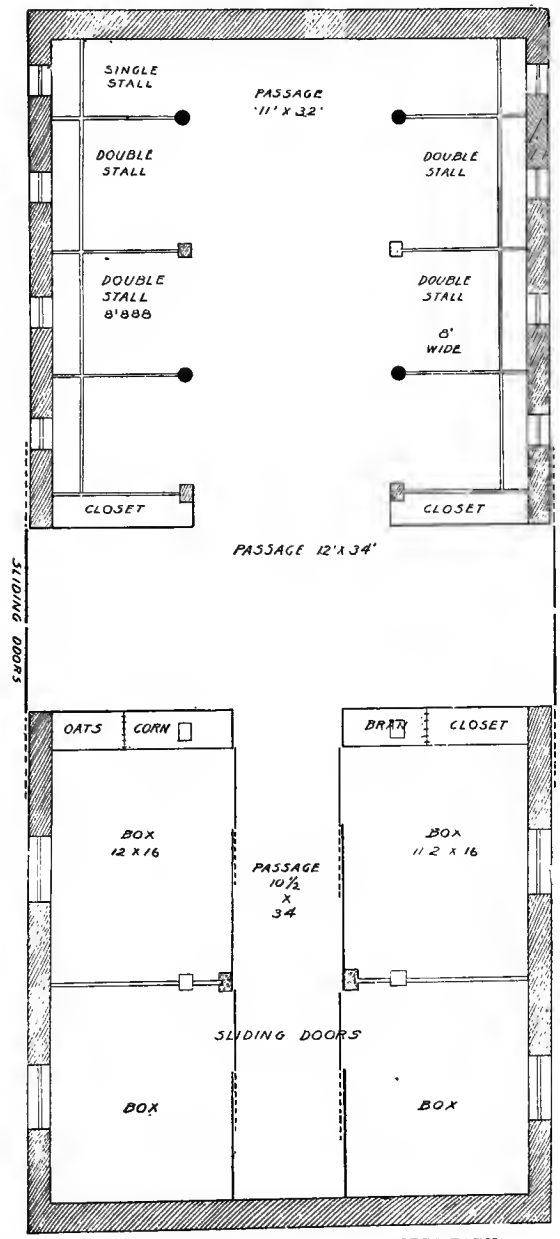


FIG. 103—THREE STORY FARM AND HORSE BARN.

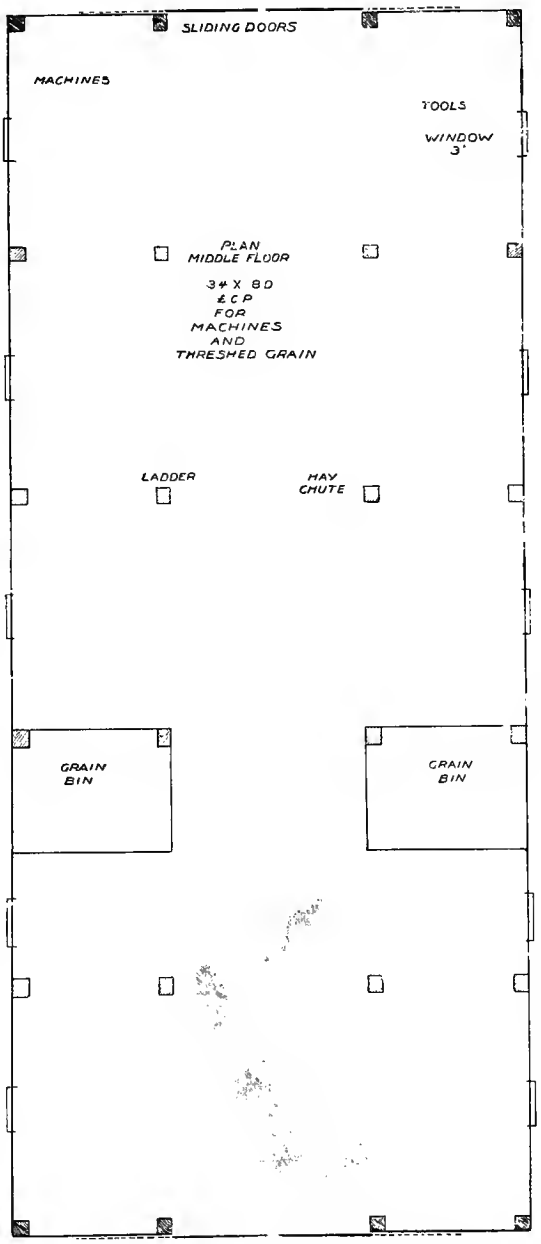


FIG. 104—THREE STORY FARM AND HORSE BARN.

is taken in from outside, though empty wagons may be driven through the second story. To make the drive high enough to take in loads of hay would be a useless extravagance. Hay doors may be put in each end. To take out braces and yet make the center span of joist-bearers strong enough can be done by the wooden truss shown which makes the span unbreakable.

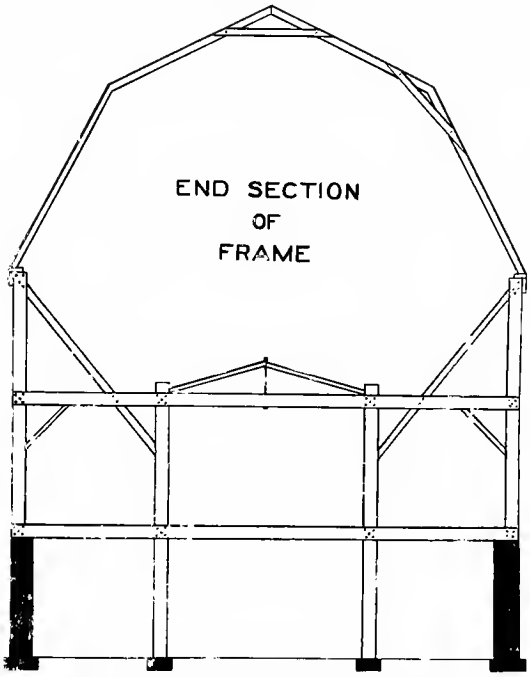


FIG. 102—THREE STORY FARM AND BORSE BARN.

AN IOWA STALLION BARN.

The brick stallion barn shown in Fig. 105 was built by Champlin Bros. in Iowa at a cost of $16,100. This barn is built of solid brick and is 140′ x 75′. The front elevation shows two stories high, the rear is three stories. (See Fig.

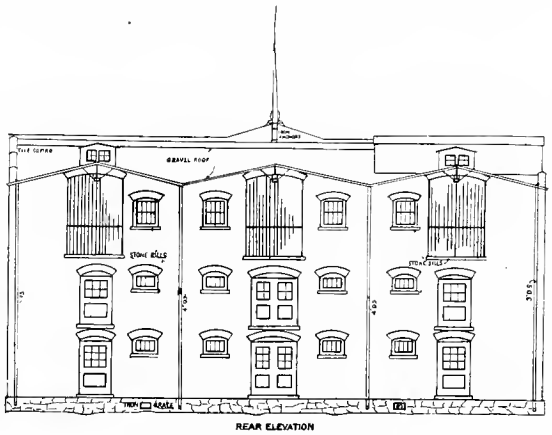


FIG. 107—IOWA STALLION BARN.

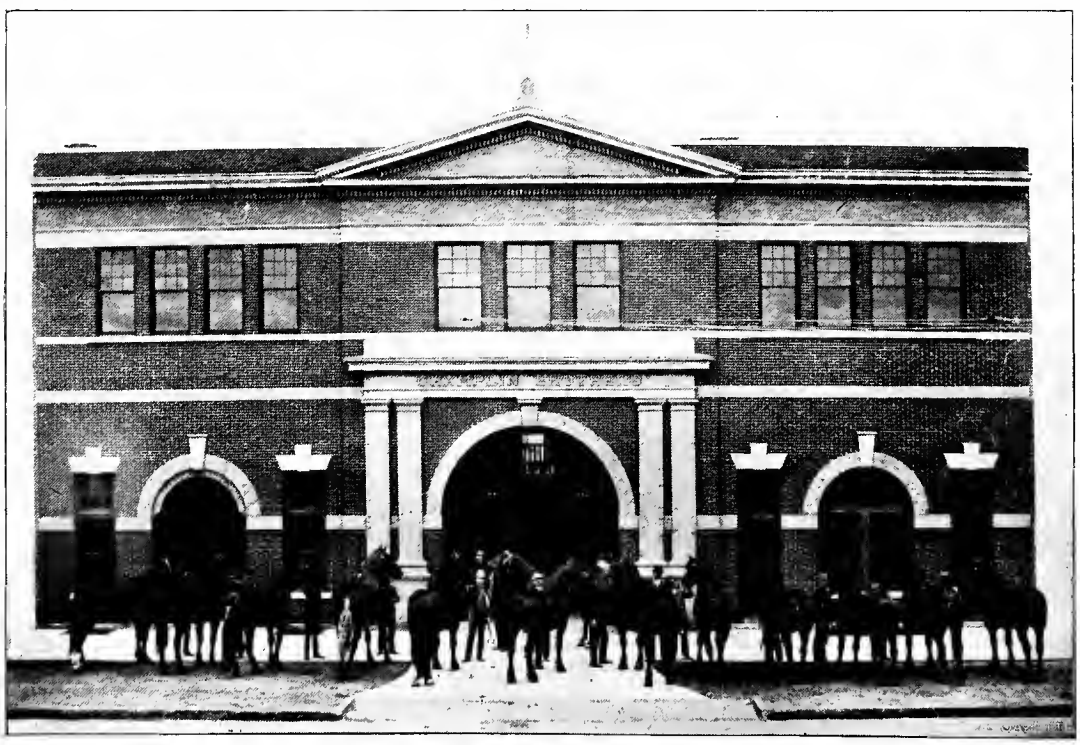


FIG. 105—IOWA STALLION BARN (FRONT ELEVATION).

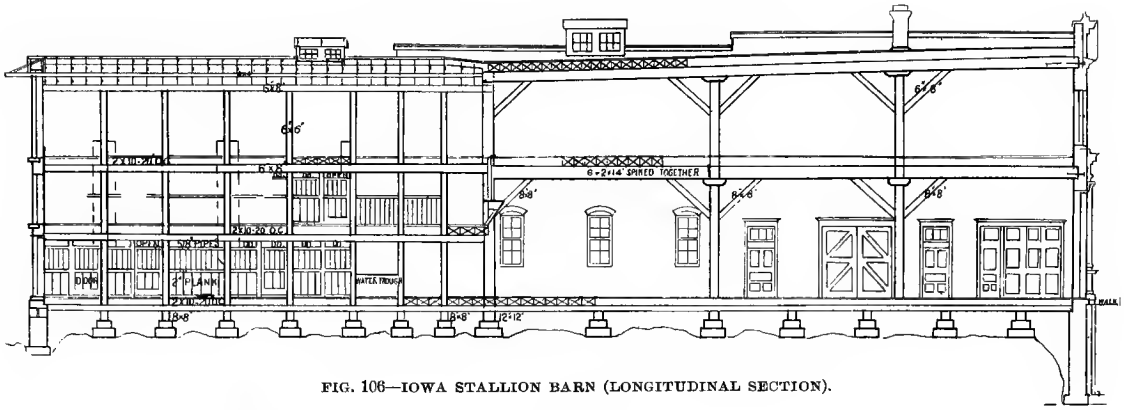


FIG. 106—IOWA STALLION BARN (LONGITUDINAL SECTION).

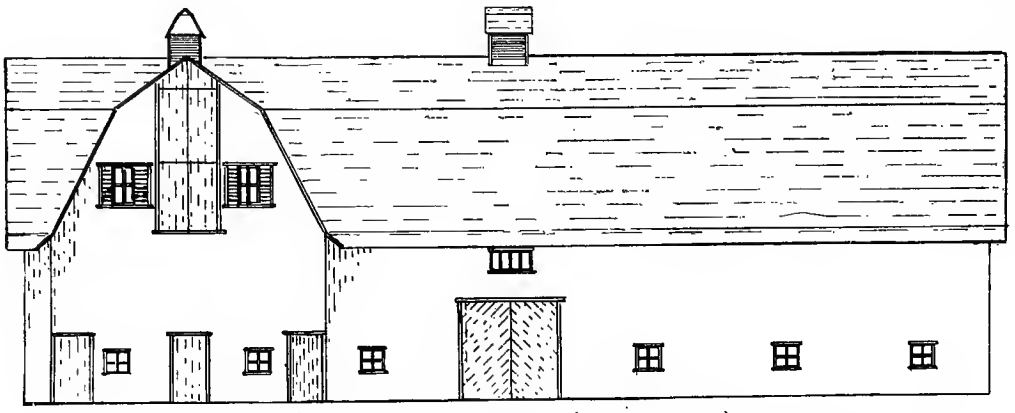


FIG. 108—BARN FOR FORTY HORSES (SIDE ELEVATION).

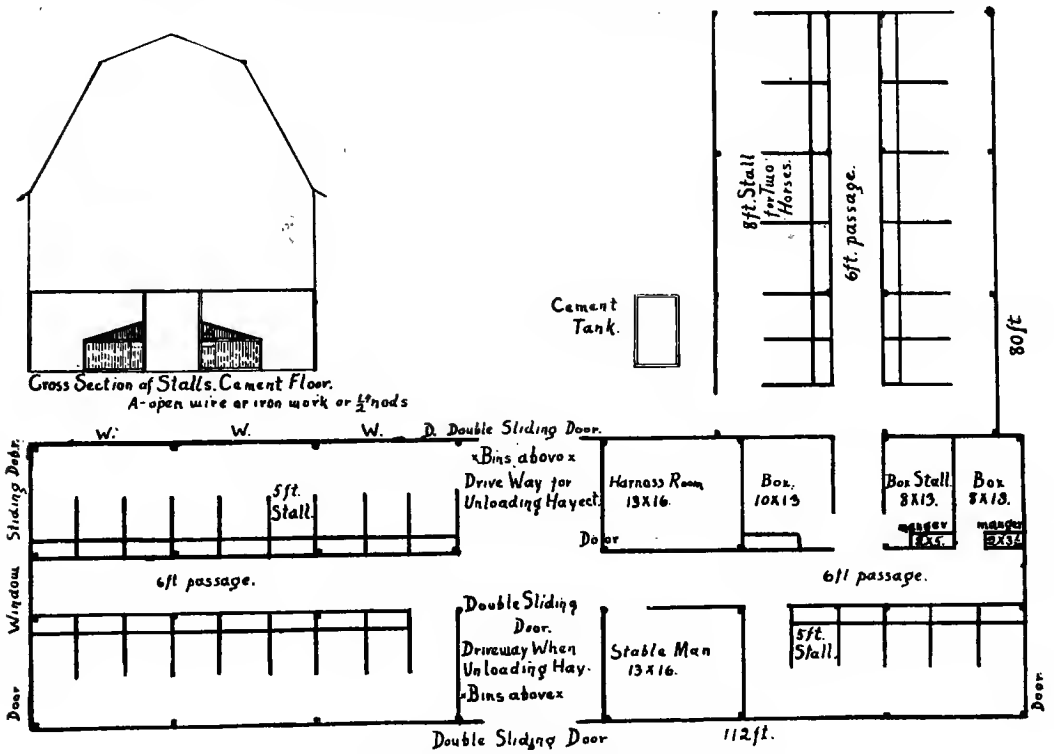


FIG. 109—BARN FOR FORTY HORSES.

107.) The first and second floors are for horses and the third floor is for hay-mow and grain bins. It has a capacity for 100 horses, there being 40 box-stalls and 60 single stalls. The blacksmith shop, heated harness-room, wash-room, robe-room, offices and large space for showing horses are on the first floor (Fig. 106), and a large carriage room is on the second floor. The barn is equipped with an electric motor, which cost $1,000, to run elevator, grind feed, pump water and unload hay and oats.

BARN FOR 40 HORSES.

This barn for about 40 horses (see Figs. 108 and 109) was erected on a large Kansas farm and has many excellent features. There are stalls for 42 horses and three box-stalls, abundant hay room, harness room and room for stableman. The latter room may be made into a box-stall if preferred. The diagrams show the interior arrangement and exterior appearance of the barn.

PLYMOUTH HACKNEY STUD STABLES.

An excellent illustration of the combination of utility and taste which may be obtained in the construction of the stabling on a horse breeding farm is found in the equipment of Plymouth Stud, property of Eben D. Jordan, Chiltonville, Mass., near Plymouth Rock. These buildings represent the accretions of several years, as demands for space multiplied, but the same general style of architecture has been preserved throughout, presenting a very pleasing impression. Plymouth Stud comprises a breeding department, where stallions, mares, foals and young horses receive attention, and a training department, where harness and saddle horses are schooled for the market and for the shows. Good taste rather than lavish outlay has characterized the building of this establishment, and the idea ever foremost has been the utility and sanitation of the stables and the comfort of the men as well as the horses.

Details are not submitted, but the accompanying illustration No. 109a will afford an idea of the equipment of the place in general. Stallion boxes, brood mare boxes, boxes with yards for foals and yearlings, with liberal allowance of room in each instance, constitute the stabling, and comfortable sleeping and resting quarters for the grooms are also provided. In connection with the stables a commodious riding school has been erected, one of the largest and best lighted to be found at any private establishment in this country. This structure has been very valuable in conditioning horses for the show arena and the market. All the buildings are frame with shingled sides and roofs and are stained lichen-gray.

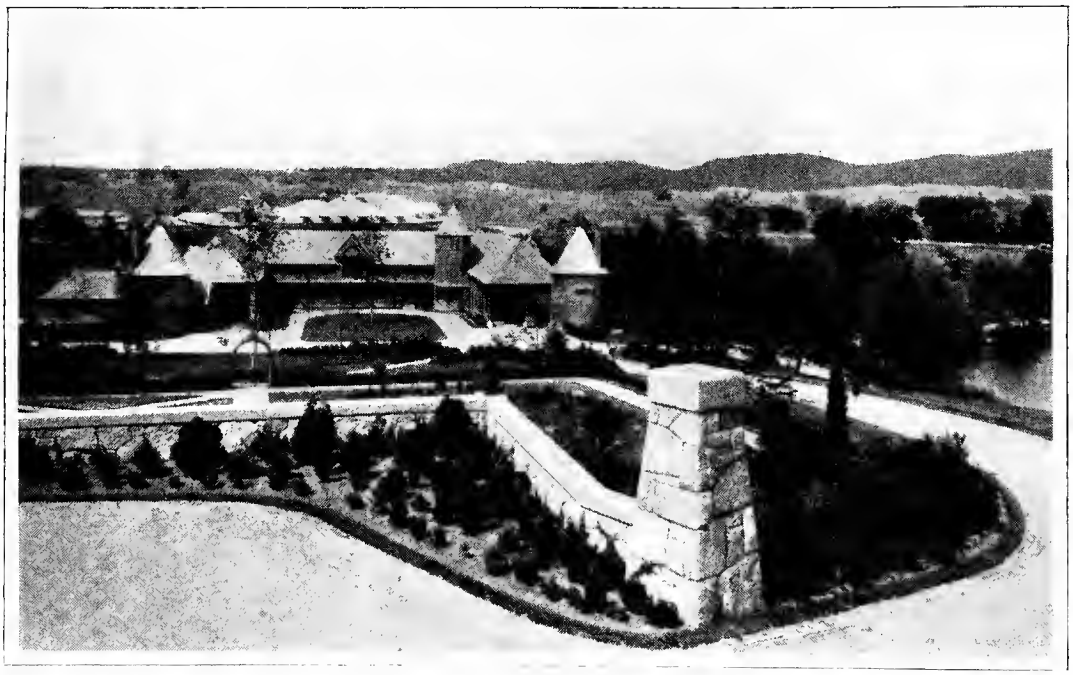


FIG. 109a—PLYMOUTH HACKNEY STUD STABLE.

BANK STABLE FOR HORSES.

This building is 36′ wide and 52′ long, there being two bents of 16′ each and for convenience

in placing posts two bents of 10′ width at the box-stalls. It has a feed alley 6′ wide and a wider passage between the box-stalls. Bins may be above this wider passage with spouts down. Abundant light and air may be provided, as the wall sets back to allow a row of windows on each side. Ventilation also through the hay chutes

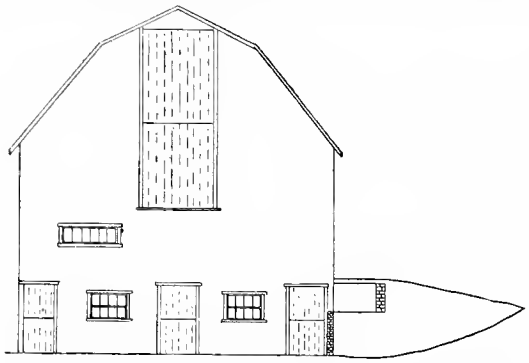


FIG. 110—BANK STABLE FOR HORSES (FRONT ELEVATION).

will help keep the horses in health. The stalls are 5′ 4″ wide, three to a bent. (See Figs. 110 and 111.)

McMILLAN'S HORSE BARN.

A convenient barn for draft horses built by H. G. McMillan on his Iowa farm is shown in Figs. 112 and 113. The dimensions are 56′ x 76′. The engraving (Fig. 112) shows the north end of the barn. On the right extending from the southwest corner of the barn to the west is a shingled roof shed 24′ x 48′. On the left extending east from the northeast corner of the barn is another shed 32′ x 80′. Both of these sheds open to the south. There is a driveway running north and south and crosswise east to west. The drop roof on both sides gives excellent light in the upper part of the barn, and may also make the structure stronger. The barn has a capacity for 175 to 200 tons of hay.

A KENTUCKY BARN FOR SPEED HORSES.

What is considered one of the best barns in Kentucky from a sanitary and practical stand-

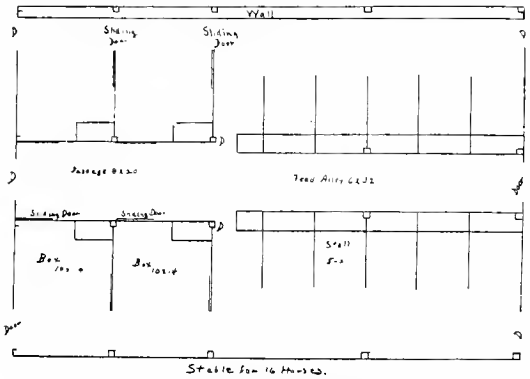


FIG. 111—BANK STABLE FOR HORSES (PLAN).

point is that of L. V. Harkness at the Walnut Hall farm at Donerail, near Lexington. It is an impressive structure on account of its size and on close examination all practical horsemen are taken with it, mainly because of its practical merit.

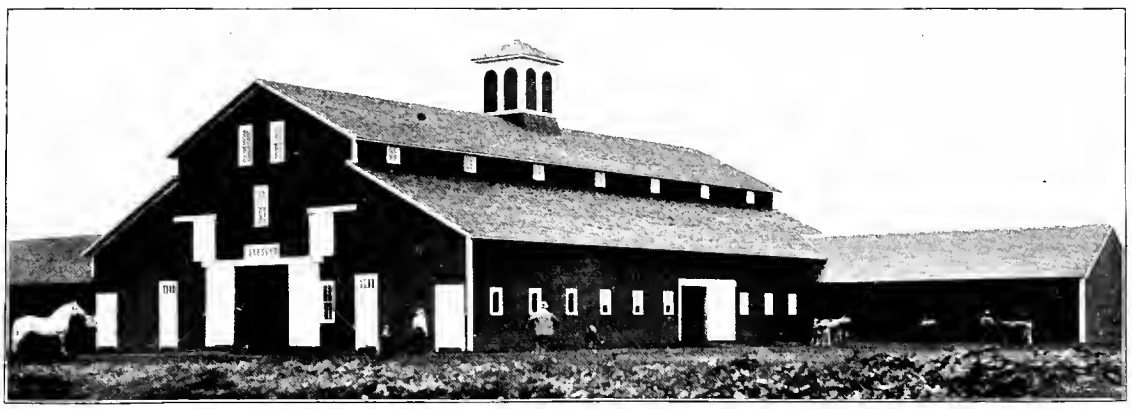


FIG. 112—M'MILLAN'S HORSE BARN (ELEVATION).

The building itself is 400′ long by 70′ wide. (See Fig. 113a.) It is located on a knoll not far from the track on which the Walnut Hall youngsters are developed for speed and not far from the homestead where Mr. Harkness makes his home when in Kentucky. The situation is superb, as it insures the best of drainage, an absolute necessity where the stall floors are composed of dirt, as is the case at Walnut Hall.

In the center of the stable from one end to the other is a large runway, large enough so that in

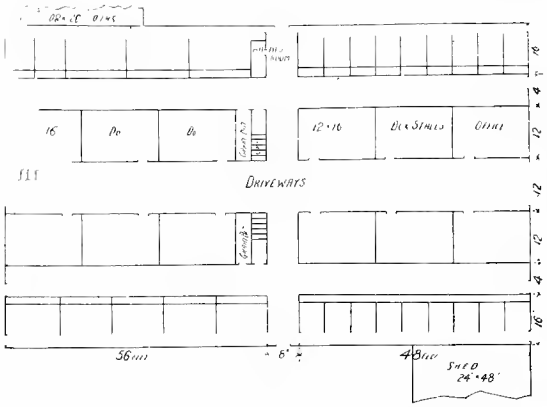


FIG. 113—M'MILLAN'S HORSE BARN (GROUND PLAN).

stormy weather it is possible to exercise the horses indoors. (Fig. 113b.) This really has all the merits of a covered track—all that is needed indeed for a barn in that section of the country. Exactly in the center of the stable is a section for road carts and sulkies and here also are doors opening from the stable capable of allowing a man in a vehicle to drive out. In this section are cement floors for the washing of the vehicles.

On either side of the driveway, which extends the whole length of the barn, are the box-stalls. These are commodious with doors facing on the interior driveway and also doors facing on the exterior, while above are small windows. These exterior doors are constructed so that in case of fire the attendants will be able to liberate all of

FIG. 113a—A KENTUCKY BARN FOR SPEED HORSES (EXTERIOR VIEW).

FIG. 113b—A KENTUCKY BARN FOR SPEED HORSES (INTERIOR VIEW).

the horses without going into the building. Once out the horses can roam as they please and be captured at will.

Above the large box-stalls is limited space for the daily feed of the horses. Evidently Mr. Harkness' idea in constructing the building was to afford plenty of space for air, and in this respect the barn is an admirable pattern. That the idea is all that was intended is best evidenced from the fact that few horses have ever had any sickness in the stables.

The entire barn is of frame construction and while not elaborate in regard to finish is certainly practical and has every convenience for everyday use.

AN ILLINOIS STALLION BARN.

This stallion barn built a few years ago Illinois is regarded by many as a model of convenience, although there is nothing very pretentious in its architecture, neither is it an expensive building.

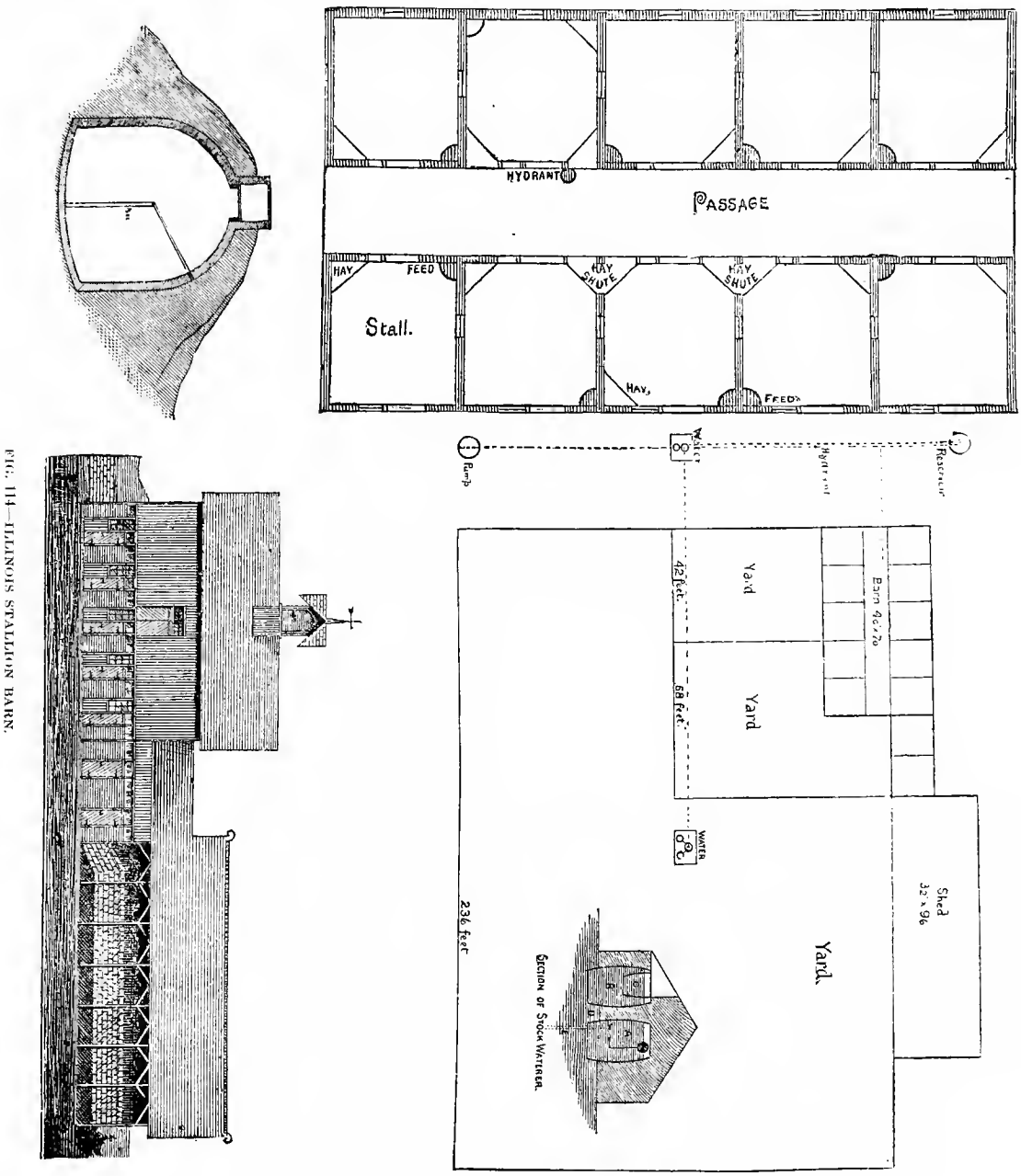


FIG. 114—ILLINOIS STALLION BARN.

Fig. 114 represents the south elevation of barn and shed connected with it. Basement with box-stalls and the plan of the yards and distribution of water also are shown in the drawing. (Fig. 114.) The barn (40′ x 70′) is located on the south and near the top of a gentle ridge running east and west. It is constructed partly on the side-hill or basement plan, the north wall being only full height of basement and this wall is all above ground except 3′, which gives room for large windows. All other foundation walls are on a level and extend but a few inches above the ground floors, which are of earth in the boxes as well as in the driveway of basement. Foundation walls and frame-work of basement correspond with the main framework of the building.

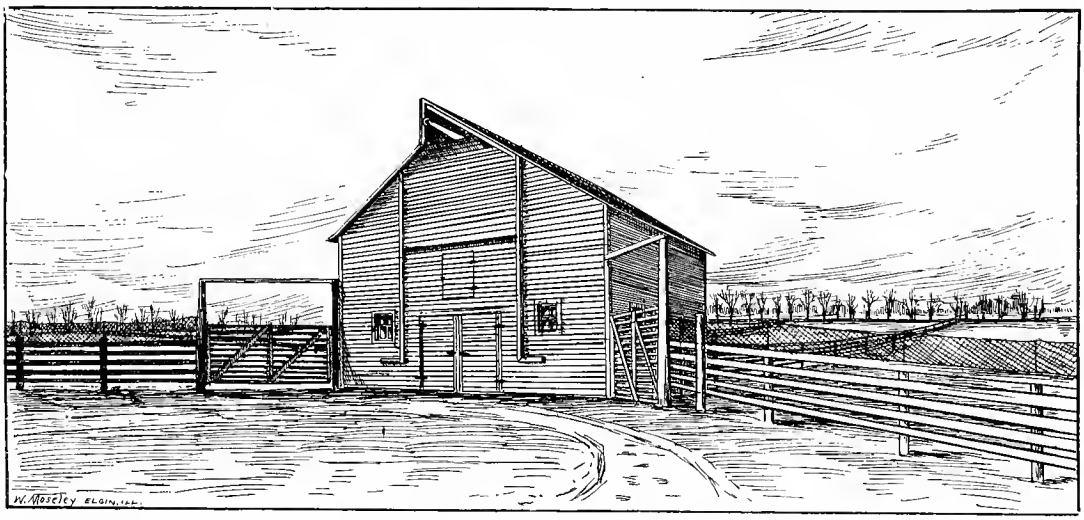


FIG. 116—CONVENIENT COLT STABLE (EXTERIOR VIEW).

The framework, consisting of five 14′ bents, gives the space of 28′ x 40′ on each side of the driveway on the second floor. This driveway is reached from the north side of the building. A stone wall 20′ long and parallel with the building, 14′ distant, gives foundation for a driveway. Against this earth is graded, forming an easy approach to the second floor.

The reservoir or cistern is located on the highest ground obtainable, and this not being as high as desired a portion of the arch is built above the natural level and heavily banked with earth. It is bricked up from the bottom with an 8″ brick wall laid in cement and the mortar well flushed against the earth bank and finished with a heavy coating of cement on the inside of brickwork. The pipes should be laid at the same time the cistern is built. The diagram shows the manner of constructing the arch. A post is firmly set in the center of the cistern to a height at which the arch is designed to begin. A hinged rod is attached to the top of this post, which is swung round by the workman as his work proceeds and enables him to form a perfect arch.

Inch-and-a-quarter gas pipe is laid from cistern to hydrant in barn basement and also to yards and pastures as desired.

The diagram representing stock-waterer (included in diagram) shows two barrels set side by side, connected by a short piece of gas-pipe, D. The water enters the barrel, A, from the bottom, E, to a height controlled by a float connected by a copper wire to a hinged valve. This allows the water to stand in the barrel to just such a height as desired. As the barrels, A and B, are filled to the same height any water taken from the drinking-tub, C, is quickly replaced. For a drinking-tub one-half of a beer barrel set in the end of a kerosene barrel may be used.

CONVENIENT COLT STABLES.

The colt stable illustrated and described herewith is one of a series built by the late M. W.

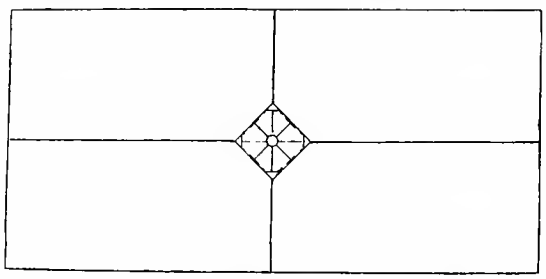


FIG. 115—CONVENIENT COLT STABLE (ARRANGEMENT).

Dunham at Oakdawn, the noted Illinois horse-breeding establishment. He regarded these

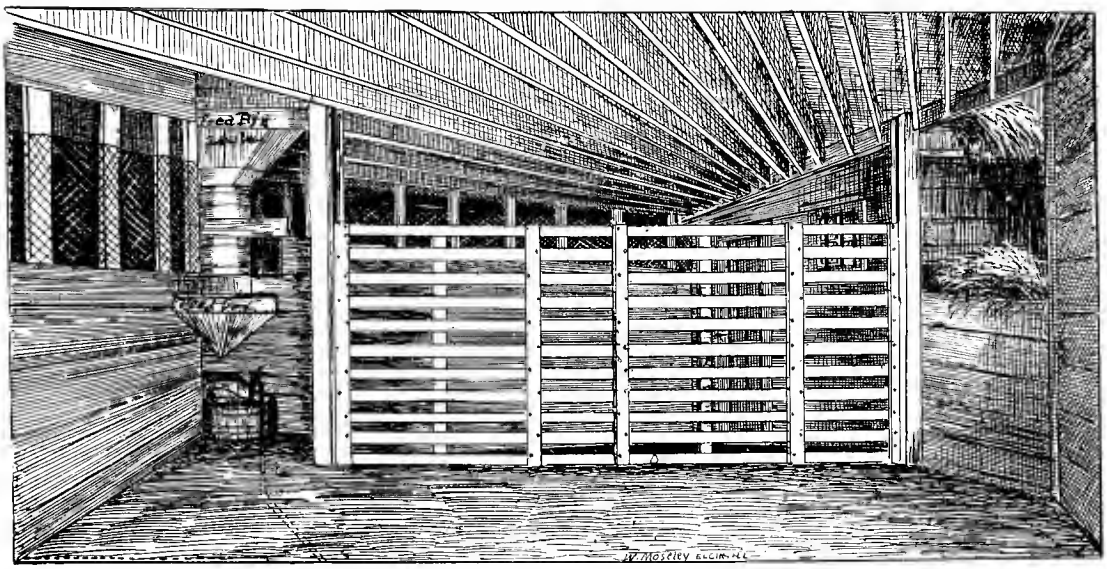


FIG. 117—CONVENIENT COLT STABLE WITH PARTITION IN PLACE.

stables as of especial value with reference to the development of young horses.

The buildings are situated in line east and west, about 40 rods from building to building. The strip of land used is 60 rods wide. This gives a pasture 20 x 30 rods for each field and each affording abundant pasture for two animals the year round. (See Fig. 116.) Of course in the winter a certain amount of hay is necessary. Each stable contains stall room for eight animals, with the partitions in (Figs. 115 and 117), so that four animals are in the fields and four in the stable alternately. In the summer time the doors are left open and are provided with a canvas fastened at the top, fitting the doorway closely. This excludes the light and protects the animals when in the stable from the flies. In the angle of each stall, which combine to form the center of the stable, is a hydrant to which is attached a float valve (see Fig. 118) which controls the supply of water, except in the intense cold weather in the winter when the float valve is removed and the tub filled with water from the hydrant as required.

The grain is also fed from the center, directly over the water tub. The feed bin is about 6′

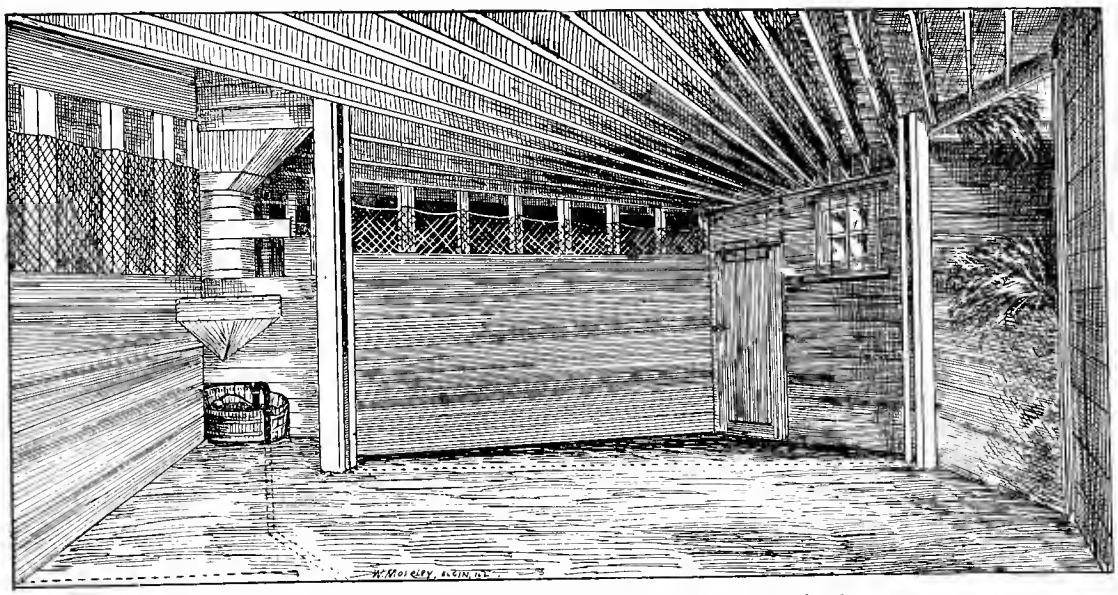


FIG. 118—CONVENIENT COLT STABLE WITH PARTITION REMOVED.

square and of sufficient height to hold about 200 bushels of oats. The bottom of the bin tapers to the center at an angle of about 60° and is closed by a circle of sheet-iron with eight holes of sufficient diameter to hold two quarts of oats, and projects to within 2″ of the bottom of the feed trough. Another sheet-iron plate, fastened

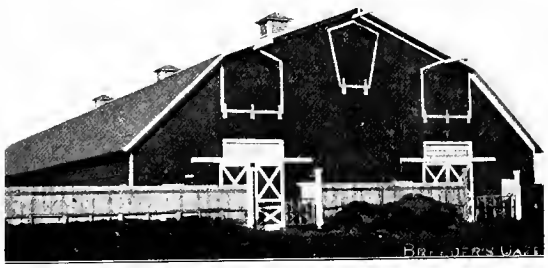


FIG. 119—MULE BARN (END ELEVATION).

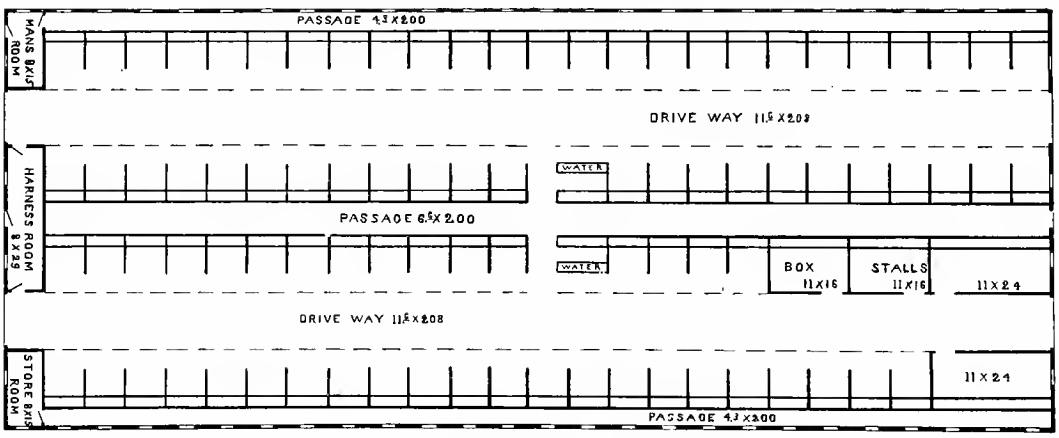
in the center, with holes corresponding to the pipes, is placed flat upon its top surface, to which is riveted a lever. The slot in which this lever works is long enough to allow the opening and closing of the holes in the lower plate by the movement of the lever. By this device the movement of the lever permits the filling of the pipes with oats and the reversal shuts off the supply, giving each animal two quarts, or any quantity the pipes are made to hold—the grain filling the pipes—and is eaten from the bottom. This method of feeding has the advantage of rapidity, uniform quantity, prevents waste and secures slow feeding, consequently better mastication. The fences enclosing the pastures are 7′ high, the upper 2′ being made of woven wire.

The necessity for natural development of young horses in the open air and on green feed in order to secure the highest usefulness when grown led Mr. Dunham for many years to pasture his young stallions in the summer; and the losses incurred by accident where numbers were kept together prompted the devising of the plan just described.

Mr. Dunham found the use of these buildings and pastures of great advantage. Where the animals are put in in a healthy condition there is almost entire immunity from disease. By this means health and natural growth are secured and accidents and unsoundness are rare.

A MULE BARN.

As a type of special-purpose building the mule barn shown in the accompanying illustration, Fig. 119, is admirable in its way. It is designed for about 165 mules and the arrangement is commendable. The mules are fed, watered, harnessed and taken out without interfering with each other. The sanitation is excellent; the light is ample; the provision for aeration is sufficient and there is ample warmth in cold weather.



FLOOR PLAN OF BARN 84 X 200

FIG. 120—MULE BARN.

As the barn is quite wide three carriages and three tracks are used in filling it with hay. This saves a great deal of hand labor in moving away the hay. The floor plan (Fig. 120) explains itself. Painted neatly this barn presents a very attractive appearance.

DAIRY BARNS.

The dairy barn shown in Figs. 121 and 122 was built in Southern Illinois by the late H. L. Borden. It is a frame structure on stone piers from 1′ to 2′ off the ground. It is used as a cow stable and has a loft overhead for hay, which is elevated by hay slings in the center of the barn. The cow stable consists of two rows of stalls (see Fig. 123) with some box-stalls. Each single cow stall is 5′ wide. The passageway behind the cows is wide enough to allow the passage of a two-horse manure spreader, which saves the handling of the manure very often. The barn cost about $2,400.

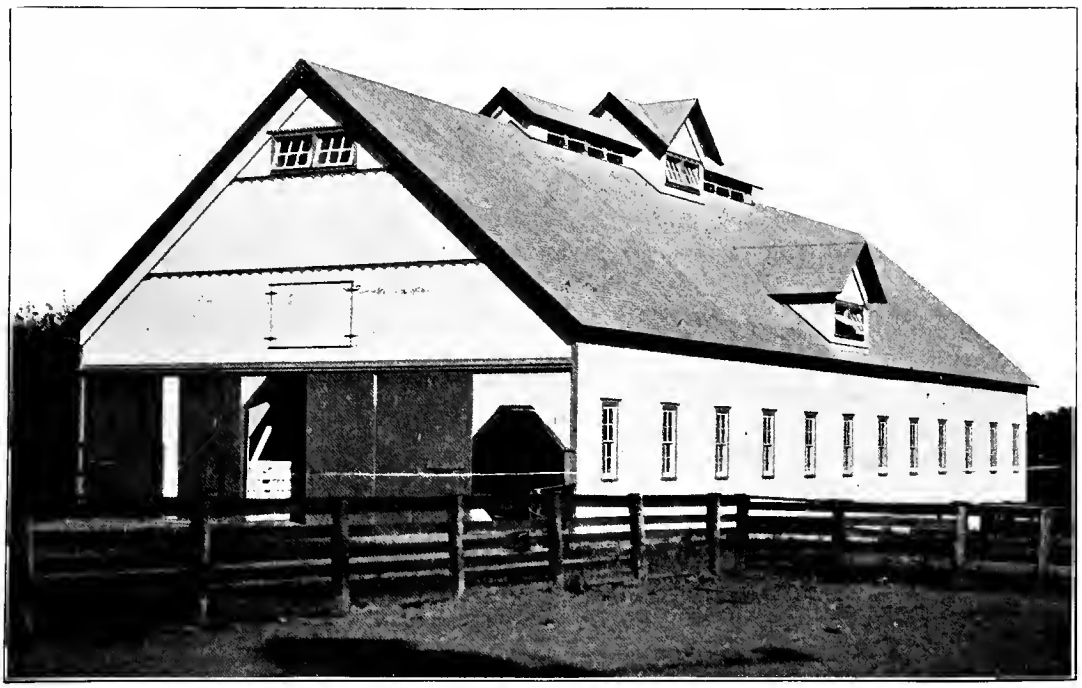


FIG. 121—ILLINOIS DAIRY BARN (ELEVATION).

A ROUND DAIRY BARN.

The accompanying plan of barn for a dairy farm was designed some years ago by Prof. F. H. King for a Wisconsin dairyman. The design was the result of a request for a plan of a barn for a dairy farm which would accommodate eighty cows and ten horses and which would permit of driving behind the cattle in cleaning and in front of them in feeding green fodder. A silo, a granary and storage place for dry fodder sufficient for all the animals were desired, and the whole was to be covered by the same roof, to be conveniently accessible in all its parts, but not very expensive.

The plan in several fundamental features embodies ideas which are believed to be worthy of general imitation:

1. Whatever other advantages or disadvantages a shelter for live stock possesses, it should in no way interfere with the best performance of the animals housed.

2. The shelter should so be built that the heat necessarily given off by the bodies of animals housed shall be sufficient to maintain the best stable temperature during cold weather and at the same time admit of ample ventilation, while

during warm weather the surplus heat may readily escape.

3. The construction should be such as to admit the needed amount of light to all the animals housed.

4. The construction of the shelter should be such as to reduce the labor of caring for the animals to the smallest amount which will admit of the largest yearly net profit.

capacity of 14,126 cubic feet, occupies the center. Around this silo in the first story 98 adult cows are accommodated in two circular rows facing a common feeding alley 9′ wide, and behind each row of cattle is a wagon drive 6′ wide for cleaning the barn, which leaves and returns to the common single broad entrance.

Extending entirely around the silo in the second story is a barn floor 18′ wide, from the

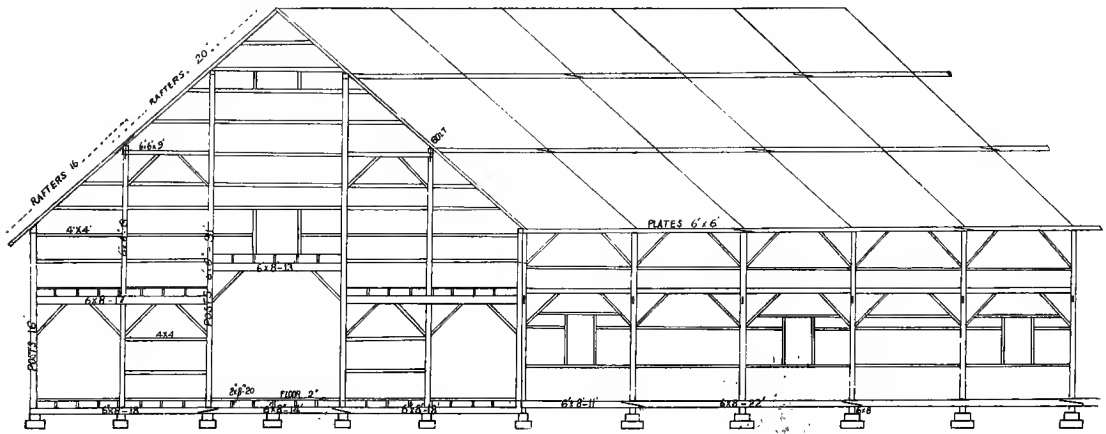


FIG. 122—ILLINOIS DAIRY BARN (CONSTRUCTION).

5. The form and arrangement of the buildings should be such as to necessitate the least first cost and the smallest maintenance expense compatible with the necessary accommodations.

Figs. 124 and 125 are birdseye views of the interiors of the first and second stories designed to show the construction of the barn and the

outer edge of which, through chutes leading to the feeding alley in front of the cattle, green fodder can be delivered to them from the wagon or dry fodder from the storage space above. This floor also permits of driving around the silo and out at the entrance after unloading, even when the silage cutter is being run to fill the silo.

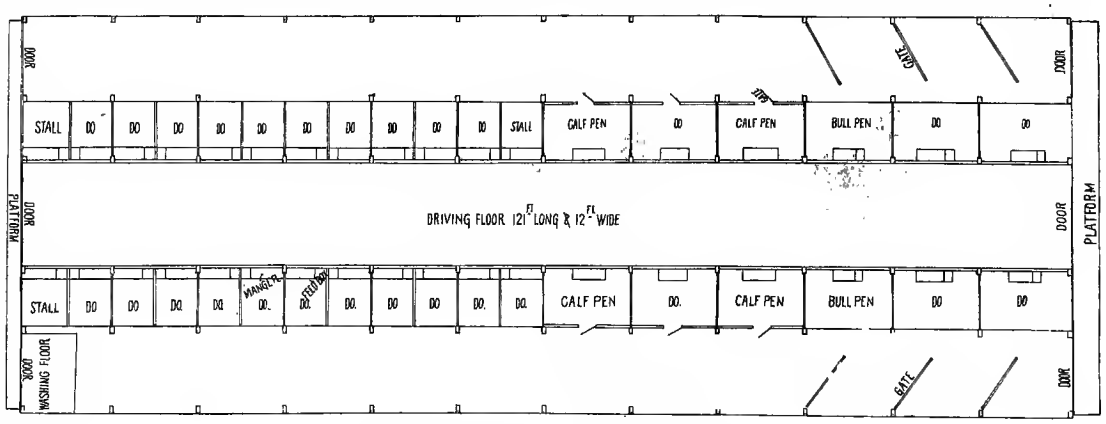


FIG. 123—ILLINOIS DAIRY BARN (GROUND PLAN).

arrangement of its interior. It will be seen that in form the barn is cylindrical, covered with a conical roof, which is surmounted by a cupola of the same form. The barn is 92′ in diameter and 28′ from sills to eaves. A cylindrical silo 24′ outside diameter and 34′ deep, having a

On the outside of the barn floor, on the right of the entrance, is stable room for ten horses, 16′ from front to rear, 34′ frontage on the barn floor and 55′ from end to end at the outside. On the left of the main entrance is a workshop and granary whose combined floor space equals that

occupied by the horses. In the rear of the silo is a space 16′ deep for farm tools, having 32′ frontage on the barn floor and possessing a floor space equal to 16 x 40 square feet. Between the tool-room and the horse barn on one side and the granary on the other are two hay bays which, together with the space above the barn floor, tool-room, granary and horse barn, furnish ample storage space for dry fodder.

The silage is delivered to the cattle barn from the silo through a triangular chute shown in Fig. 124, extending up the inside of the silo; in one side of this chute there are doors and attached to the other is a fixed ladder by which any desired level in the silo may be reached.

The foundation of this barn consists of four

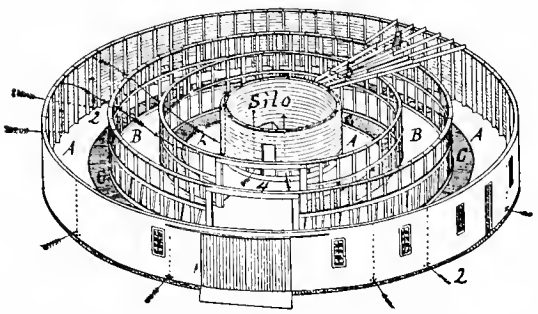


FIG. 124—A ROUND DAIRY BARN (FIRST FLOOR).

concentric stone walls, the inner one carrying the walls of the silo and through them the central portion of the floors and roof; the two middle ones carrying the stationary uprights of the stanchions, and through them the floor, main posts, purlin plates and roof, while the outer one supports the walls of the structure. The laying of the walls to a circle and leveling them was a simple matter and accomplished with the aid of a straight-edge, one end of which was fixed to a post in the center, with the lower edge at the level desired for the top of the walls. The movable end of the straight-edge rested on a ring of boards tacked to stakes driven in the ground outside the wall being built. The inner wall was first built and the straight-edge lengthened as necessary. The frame of the barn consists almost wholly of 2″ stock and the only long timbers are the eleven posts carrying the purlin plates. No mortise and tenon work was used in its construction, all work being done with the hammer and saw. The first story sills of the barn are single 2″ x 10″ plank sawed in 4′ sections and bedded in mortar on the walls, the sections having been sawed on a bevel determined by the direction of the radii of the barn. On the sills 2″ x 10″ studs are set 2′ apart and constitute the outer frame of the basement; 2″ x 12″ studs set flatwise on the two middle walls, at the right distance apart to serve as the uprights of the stanchions, and 2″ x 12″ studs in the walls of the silo, as shown in Fig. 124, constitute the vertical supports for the second story. The sills of the second story consist of short pieces of 2″ x 10″ plank spiked down upon the ends of the three outer circles of studding, as shown in Fig. 124, and of three thicknesses of 6″ boards bent around the upper ends of the silo studding and resting on the shoulders sawed for them. Two thicknesses of plank rest on the stanchion supports, but the outer sill is single; upon these 2″ x 10″ joists are distributed, as shown at 5, Fig. 124, and these carry the floor of the second story.

Each of the posts carrying the purlin plates rests on four 2″ x 10″ joists spiked together and resting on the sills carried by the two rows of stanchions, the particular stanchion uprights where these posts come being strengthened by 2″ x 6″ studding spiked to them at the edge not occupied by the cows. On the tops of these posts short pieces of 2″ x 10″ plank are spiked, as shown at 1, 1, 1, Fig. 125, and upon them the purlin plates rest, spikes being driven upward into them to hold them in place.

The rafters and studding for the second story are 2″ x 6″ stuff, the latter being set 3′ apart, and the lower ends of the rafters are carried by

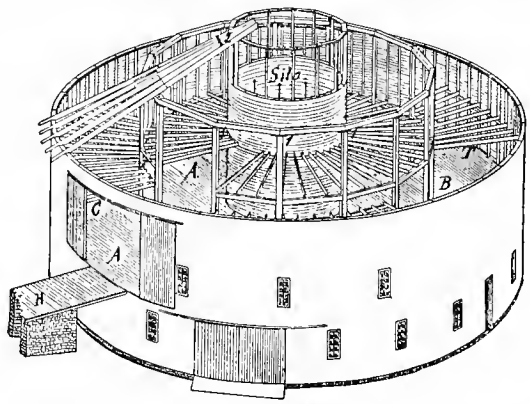


FIG. 125—A ROUND DAIRY BARN (SECOND FLOOR).

two layers of 2″ x 6″ pieces spiked to the tops of the studding, the upper layer breaking joints with the lower. Fig. 125 shows the manner of placing the rafters.

The rafters were cut so that their ends when in place were vertical and the fascia was formed by springing a board to them. The lower one or two rows of roof board were sawed in short sections, reaching from rafter to rafter, and then fencing was used, full length, and sprung to the rafters over the remainder of the roof. It was not necessary to cut shingles in laying, except on the cupola, and in laying them each man was provided with a "horse," made by driving spikes

through one edge of a short piece of 2″ plank, which served as legs and prevented sliding. A mark was filed in the edge of the shingling hatchet at a distance from the nailing face equal to that which the shingles were laid to the weather, and this served as the only guide in placing them, which was done rapidly and readily, the men following one another round and round.

This barn is covered outside with drop siding sprung and nailed to the studding so as to break joints, and on the inside of the cattle barn, horse barn and granary with shiplap.

In the construction of the silo, 2″ x 6″ studding were used above the basement, these being spiked side by side to form the eleven long ones, which extend to and help support the roof. The lining of the silo consists of three layers of half-inch lumber, formed by ripping common fencing in two, and between these are two layers of tarred paper. The same kind of lumber forms the outer covering of the silo and the spaces between the studding act as ventilating flues for the cattle barn.

The large doors slide open and are made of matched fencing nailed to cleats having the same curvature as the sides of the barn. These cleats are made by springing the boards into the desired curvature and then fastening them securely together while in that attitude. When this is done they remain bent as if they had grown in that form.

The feeding mangers in the cattle barns are made by forming the earth in the shape of shallow, round-bottomed troughs in front of each row of cattle, raising the earth between them into a broad rounded ridge. This earth after being thoroughly firmed was plastered with a coat of water lime.

When it is known that air once breathed, unless diluted with that which is fresh, cannot support higher animal life; that one-fifth of the weight of materials taken into our bodies daily is oxygen from the air, and that we must breathe 346 cubic feet of air to get it; that on the average our live stock consumes more air per capita than we do, and that horses have died from suffocation while being shipped in box cars, it should be evident that, coupled with our efforts to secure warm barns there should also be those to provide ample ventilation. The plan here described possesses a very simple, cheap and effective method. It will be seen from Figs. 124 and 125 that the 32 spaces between the studs in the walls of the silo, being open at the floor of the cattle barn and also at the top, constitute so many ventilating flues, each 34′ in length. The heat given to these flues by the silage in the silo, the warming of the air in the basement by the cattle, and the suction produced by the wind blowing through and around the cupola, all combine to maintain a strong current of air out of the barn through the cupola and in through the gangs of auger holes in the outer walls

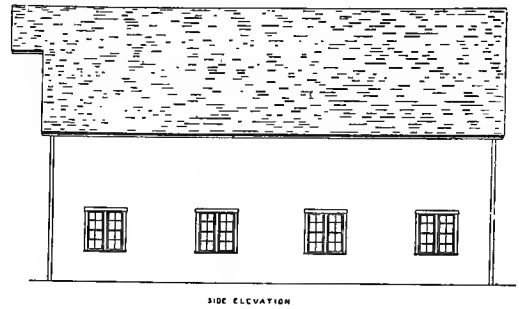


FIG. 126—A BARN FOR DAIRY COWS.

shown at 2, 2 in Fig. 124. It will be seen from the arrows in the cut that provision is made for fresh air to enter the barn from all sides, which, rising between the studding and flowing along the space between the joists, falls between the two rows of cattle, but is first mingled with the warmest air of the barn, while the coldest and most impure air is constantly drawn out from along the floor. A very important feature in this method of ventilation is that pure air comes

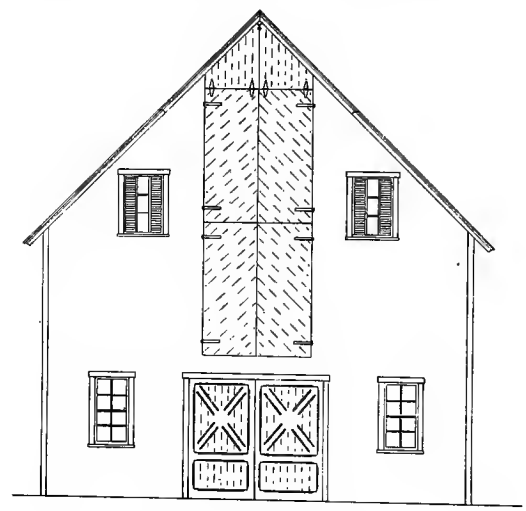
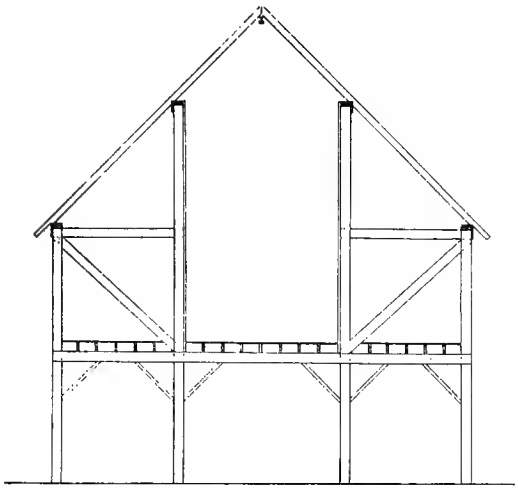


FIG. 127—A BARN FOR DAIRY COWS.

direct to all animals alike, while the impure air is drawn out in a uniform sheet all around the silo. It will be seen that this ventilation is secured without sensibly affecting the cost of the building, while at the same time the walls of the silo are kept dry and thereby protected from decay.

The temperature of a barn whose plan of ventilation is the one here described is under as good

control as is possible where artificial heat is not employed, because the cold air is introduced at the warmest part of the barn, while it is the coldest and most vitiated air in the barn which

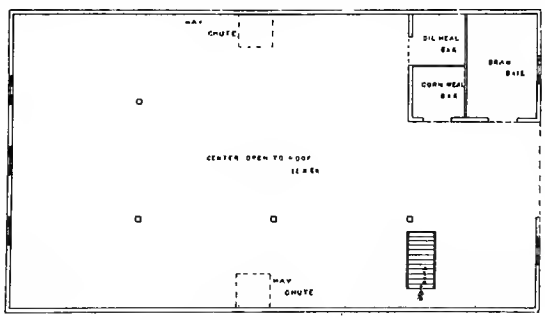


INTERIOR BENT OF WINGS JOIST FRAME

FIG. 128—A BARN FOR DAIRY COWS.

is being removed. Then when the barn is too warm the doors to the feed chutes may be opened, thus providing a direct escape of the over-heated air from the ceiling.

This barn was built for a little less than $2,400. By combining everything under the single roof, by adopting the cylindrical form, which requires



HOW FLOOR

FIG. 129—A BARN FOR DAIRY COWS.

the smallest amount of siding, roofing and paint, and which admits of the cheapest and least lumber for the frame, and by distributing the lumber so as to make it perform two or more functions a great deal of economy was secured in this barn.

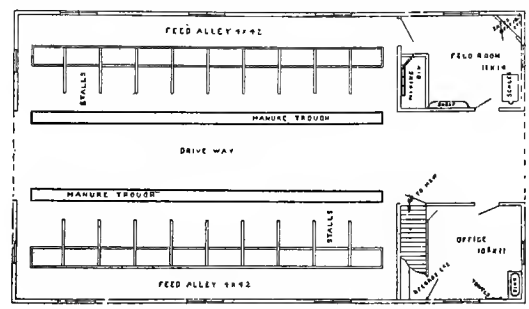
Another advantage which the consolidated barn possesses over several small, scattered structures, and especially where the feeding is done from a central point, as it is in the plan in question, is the large saving of time which it makes possible in feeding and caring for the animals.

The great economy of the circular plan for farm buildings over other types of structure diminishes as the size of the building decreases, but it is nevertheless well adapted to some of the smaller structures, such as horse barns and sheep barns. In any case where an octagonal barn is desired the circular type will always be found cheaper and more stable.

Where a silo is to stand separate from other buildings there is no other type of structure which can be built so cheaply as the circular one, even if its diameter is not greater than 12′ x 16′.

A BARN FOR DAIRY COWS.

This barn is designed for 20 dairy cows. It has ample breathing space for them and provision is made for as much light and sun as possible, unless the plan of detached shed with sky-lights is adopted; the manure is removed at the minimum of labor and the entire building is planned to be labor-saving. The little room termed an



IDEAL BARN
20 COWS

FIG. 130—A BARN FOR DAIRY COWS.

office, containing lavatory, towels, soap, records and the like, is possibly larger than is needed and in that case it may be narrowed to a smaller limit and another stall or two made of the room. The feed-room is a convenience that no dairyman can afford to do without. Feed is stored in three or more bins above and spouted down to one large mixing bin, where it is measured or weighed, mixed, scooped up and fed.

Reference to the side elevation, Fig. 126, shows the window-openings on the south side (turning the building east and west). The over-hang is to protect the door-way where hay is taken in at the end, as there is no space wasted in driveways to unload hay. Fig. 127 shows the end elevation, and in the gable is noted a combination of window and ventilated shutter that looks well and acts well. Providing these at each end there is no need of ventilators in the roof, as ventilation will be upward through the hay-chutes. These may if desired be extended through the roof, though if metallic shingles are not used (which condense vapors) there is no ill effect in

letting the ventilation proceed through the gables. The doors to take in hay open down to the line of the floor so that hay may be taken in without raising it to the level of the track. This is an open-center building, with joist-frame construction, as shown in Fig. 128. The frame is all of 2″ stuff, is very much cheaper, fully as strong and in every way more desirable than the old-fashioned frame. It is put together with spikes and bolts in a very short time. The basement is made 10′ high, not for the sake of headroom so much as for better air and light.

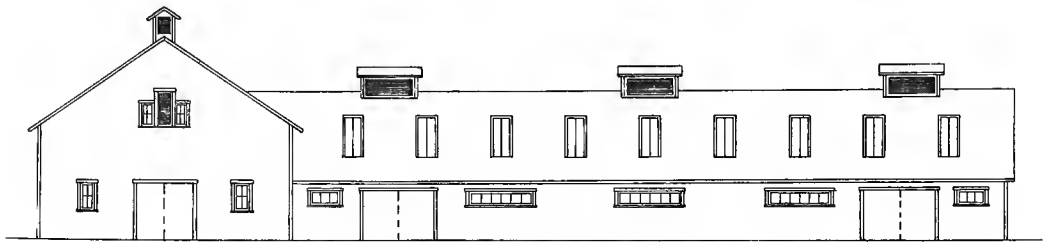
Fig. 129 illustrates the mow plan; hay is thrown down into the feed-alleys; ladders should be built in the chutes. The stairway is apt to be covered over at times with hay. The bran bin is large enough to allow storage of a great deal of bran.

Fig. 130 shows the arrangement of stalls. It will be noted that there is everywhere plenty of room. The cart can go between the cows and take the manure away. In the space between the feed-room and office the milk-wagon may stand if necessary. The VanNorman stall is used.

This barn is adapted to either beef cattle or dairy cows, though there is no provision for calves, as it was designed primarily for milking cows.

A HYGIENIC DAIRY BARN.

After studying for many years to learn the best way to fasten cattle in a barn a great many dairymen have come to believe that the best way is not to fasten the animals at all. A good plan is to have a large open shed to which light and air have free access and in which are feed-racks and troughs. This shed should be kept well bedded and aired. The cows, loose and dehorned, stand in it day and night. Adjoining this shed as planned is a small stable fitted with stalls and stanchions where some grain is fed and the milking done. The cows are in their stalls only while



ELEVATION

FIG. 131—A HYGIENIC DAIRY BARN.

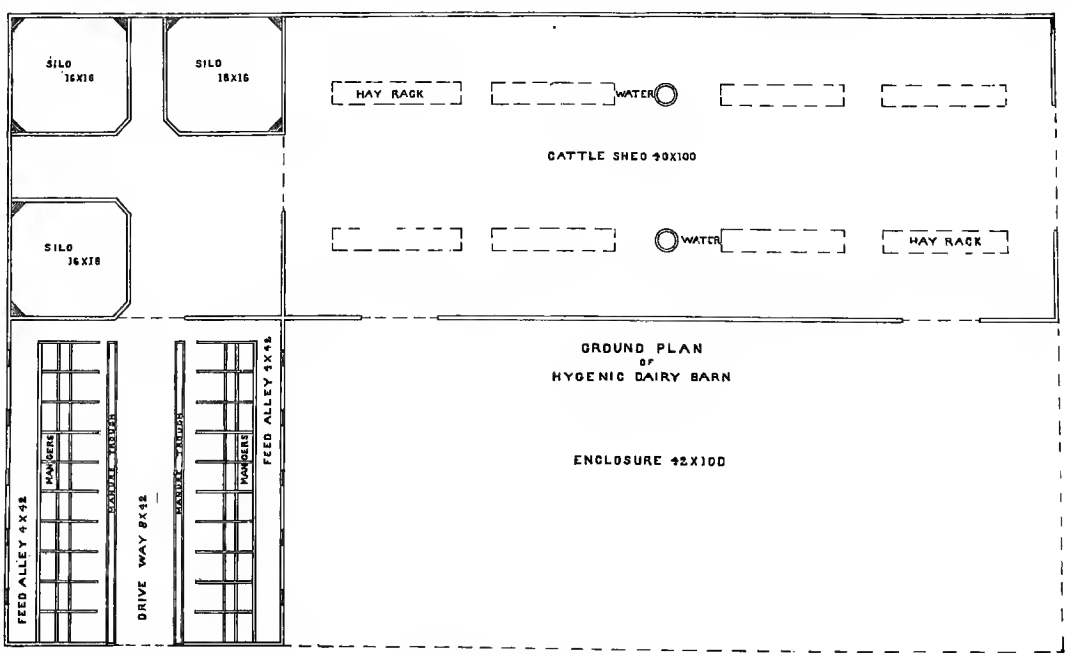
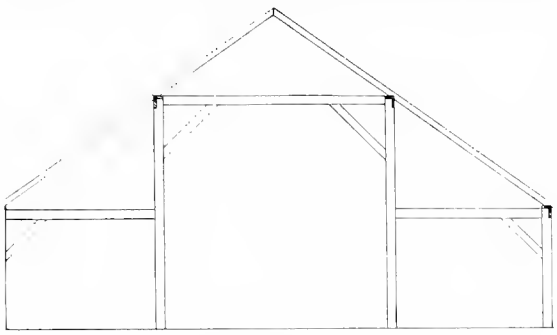


FIG. 132—A HYGIENIC DAIRY BARN.

they eat and are being milked. The barn should be white-washed two or three times a year by means of a sprayer that reaches every nook and crack and the floor kept clean. Figs. 131, 132



FRAME OF CATTLE SHED

FIG. 133—A HYGIENIC DAIRY BARN.

and 133 show the plan quite clearly. The barn is well ventilated and convenient in arrangement. Three silos are shown in Fig. 132. No provision is made for storing hay.

A NEBRASKA DAIRY BARN.

The Nebraska dairy barn illustrated in Fig. 134 was erected in 1896 to house a herd of Jerseys. The floor plan and dimensions are shown in Fig. 135. The cows stand in the south L, which is protected by the north L from the winter winds. The two Ls are the same size—each 30′ x 48′, 8′ posts. The barn is floored upstairs as well as down (except the space occupied by silos), and cows stand high and dry 3′ to 6′ above the ground, and there is a window for every two cows. The latter stand in two rows facing in on a feeding alley and are tied with halters. The floor of the manger is level with the feeding alley and for convenience in cleaning the manger is open in front.

There are two thicknesses of boards on all sides, keeping the temperature even and above

FIG. 134—A NEBRASKA DAIRY BARN (FRONT VIEW).

the freezing point. The silos extend 10′ below the floor and up into the loft, making them about 20′ deep. The silos and the separator-room have a thickness of building paper between the boards. With a separator at the barn only the cream is taken to the dairy-house and the skimmilk is fed warm to the calves and pigs. The barn has a root

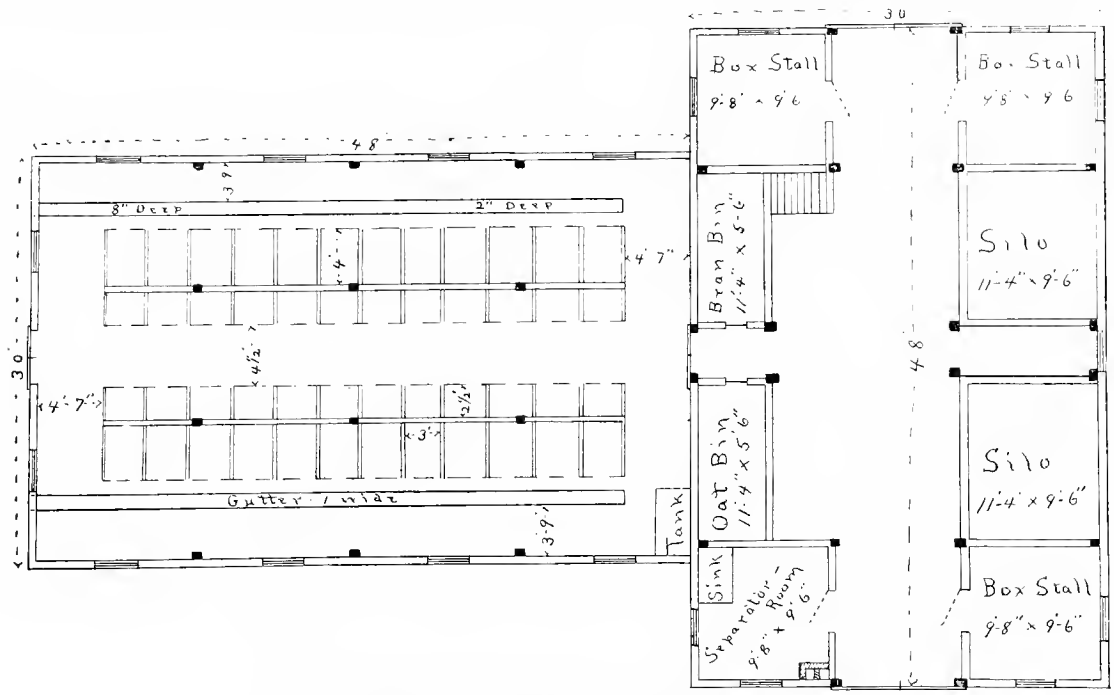


FIG. 135—A NEBRASKA DAIRY BARN (GROUND PLAN).

cellar under the south end and cost $1,300. It will accommodate a dairy herd of about 30 cows.

A PENNSYLVANIA DAIRY BARN.

A very complete, elaborate and convenient barn (Figs. 136 and 137) for dairy cattle is thus described by the proprietors:

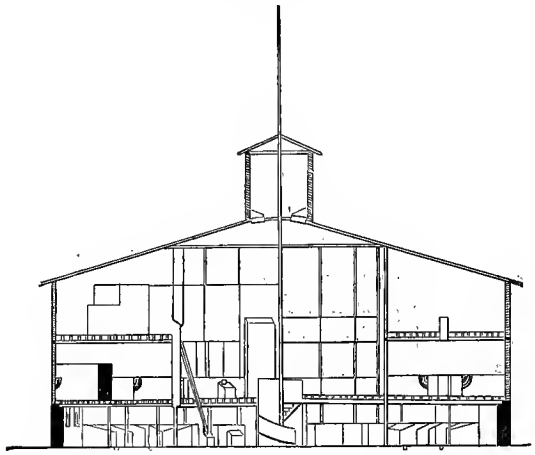


FIG. 136—A PENNSYLVANIA DAIRY BARN (SECTION A B).

"Our barn is a polygon of 16 sides. It is believed that nothing has been neglected which would add to the comfort or healthfulness of the herd. The barn is heated by steam and in winter a uniform temperature of from 40 to 45° F. is maintained night and day, never colder than

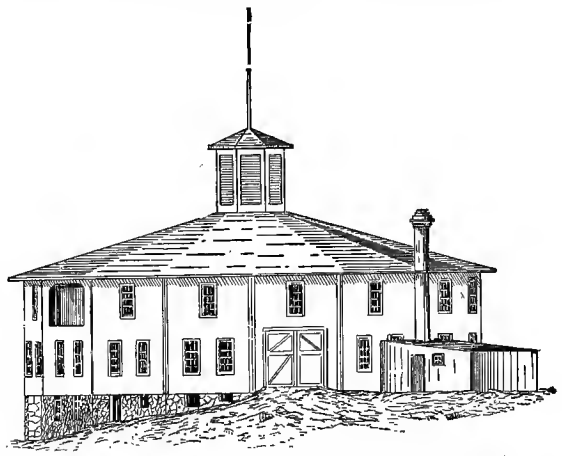


FIG. 137—A PENNSYLVANIA DAIRY BARN (ELEVATION).

40°, never warmer than 45°. Self-registering thermometers in locked cases show at all times any variation from this temperature. The aim is to maintain a temperature just above the freezing point.

"More attention to proper ventilation has been paid than to all else. The barn is surmounted by a cupola 20′ in diameter. This is open every day and night in the year. The lower sash of each window is raised 8″ and a board placed under the sash. A hole 6″ in diameter is cut through this board in which is placed a zinc pipe opening outwardly and turned up on the inside some 3′ in height. This allows for the admission of air between the two window sashes and also of a full current of air through the 6″ pipe, thus

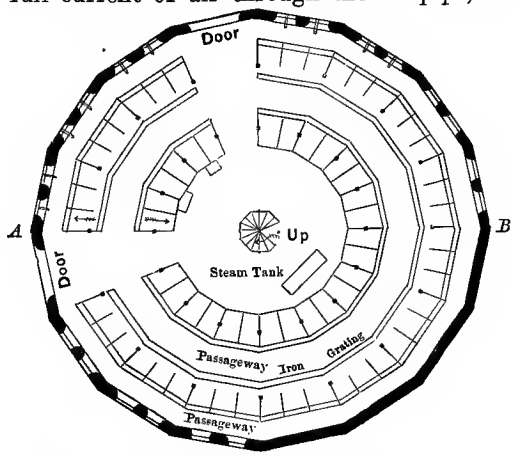


FIG. 138—A PENNSYLVANIA DAIRY BARN (BASEMENT PLAN).

preventing any possibility of a current of air striking directly upon the animals. By this arrangement, no matter what the weather may be, a full supply of pure fresh air is given to every animal by the current from the lower floor passing up the stairway in the center of the barn,

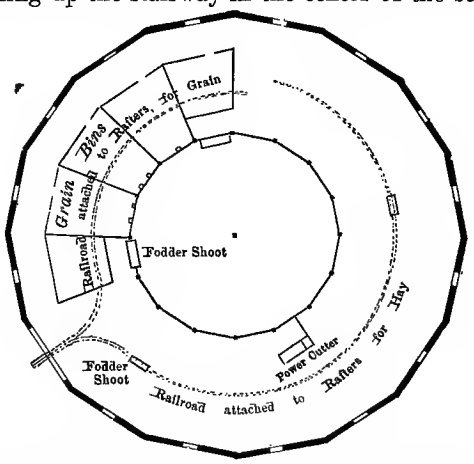


FIG. 139—A PENNSYLVANIA DAIRY BARN (SECOND FLOOR PLAN).

and also through two chutes extending from the lower floor well up toward the roof.

"The basement (Fig. 138) of the stable is devoted mainly to the milking cows. It is laid with concrete. Gutters covered with iron gratings extend back of the cows and terminate in a sewer which leads 100 rods away from the stable. This floor can be scalded out with hot water, the

gutters and sewers flushed and the cattle put back in the barn on a dry floor in an hour's time.

"The first floor (Fig. 140) is of two thicknesses of matched yellow pine with tarred paper between

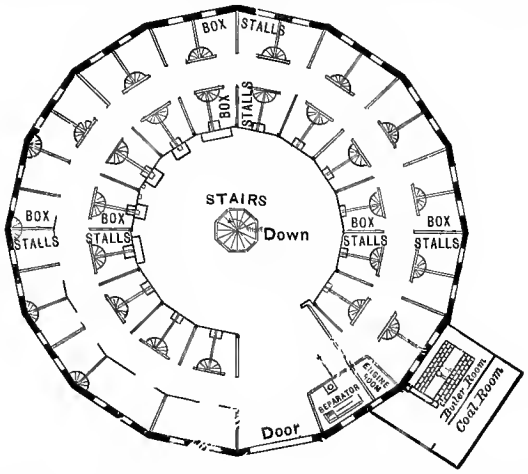


FIG. 140—A PENNSYLVANIA DAIRY BARN (FIRST FLOOR PLAN).

the layers. Sawdust is used for bedding on this floor, which is devoted mainly to box-stalls, both open and tight, for the service bulls and for cows soon to calve.

"In a room on this floor is placed the cream separator and engine. On this floor is also a cleaning machine, which by a system of revolving brushes cleans a cow perfectly in from three to five minutes' time. During the winter months each cow receives a daily cleaning, three men being able by this method to thoroughly clean 160 head per day.

"The second-floor space (Fig. 139) is devoted to storage for fodder, grain and bedding and also for power cutter, which cuts one ton of dry corn-fodder into one-third inch lengths in 25 minutes.

"The barn is lighted by 60 incandescent electric lamps. A night watchman is employed who, at intervals of every half-hour, makes a complete tour of the stable, seeing that all is well, a touch of the button enabling him at any time to notify the superintendent of anything wrong. To insure the watchman's wakefulness and attention to duty an electric time detector is in use which keeps perfect record of his movements through the barn."

A WISCONSIN DAIRY BARN.

The barn shown in Fig. 141 was built by A. Dutton & Son in 1896. It is 60′ in diameter and built on a southern slope with a basement for stock. Stone was used on the hill side; the rest is built the same as the upper part. The studs are 2′ apart; it is sided with drop siding and sealed on the inside. The basement floor is made of cement. There are 20 patent stalls and room for 15 head of young cattle, six horses and a box-stall. There is a silo in the center 16′ in diameter and 34′ deep. It will hold 150 tons of silage. The studs above the basement are 20′ high; this makes the barn 28′ high to eaves. There is room for 70 tons of hay. A hay-carrier is used on a circle track. On each side of the driveway there is granary room for 2,000 bushels of oats and a carload of bran. The silo is filled from the upper floor.

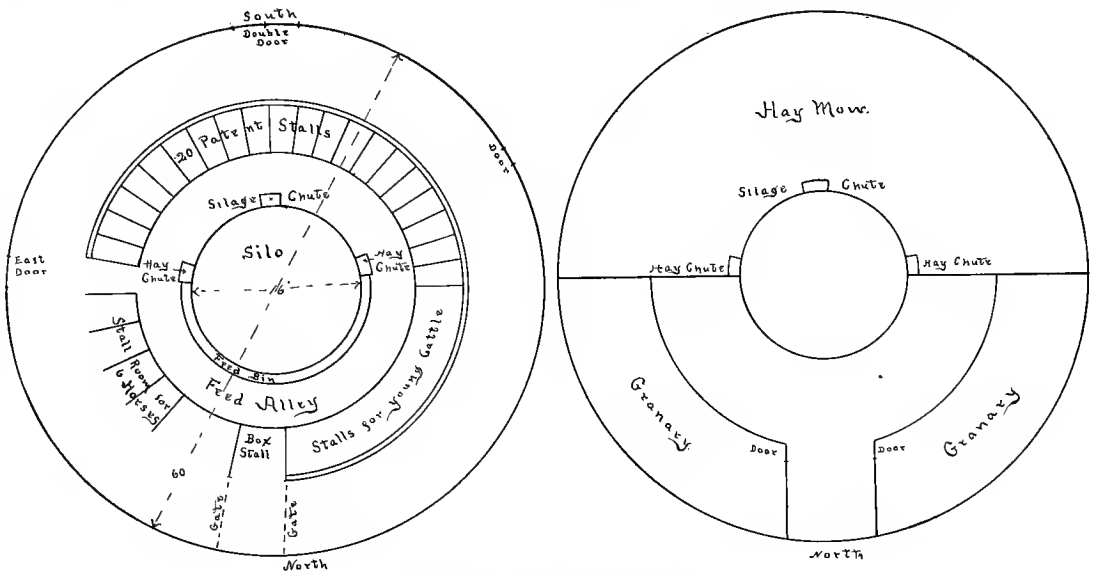


FIG. 141—A WISCONSIN DAIRY BARN.

SWINE BARNS AND HOUSES.

What would be the business future of the swine breeder whose hogs were compelled to be exposed to the cold blasts of winter or the glaring sun of summer? What would their condition be if they were obliged to eat and sleep in filth? What would the pig crop be if the sows were allowed to farrow in the fence corner some cold stormy night with only the canopy of heaven to shelter them? Answers to these questions will urge the proper equipment of the farm for the breeding of pure-bred swine. How extensive the equipment should be will depend of course on the number of animals to be carried on the farm and the amount of money to be invested.

First a swine breeder should have necessary buildings for housing the herd, the feed, the apparatus for mixing and preparing the feed and the procuring of the necessary water. There are many kinds of buildings for this purpose, many of which are satisfactory. Breeders have different ideas regarding this matter, many preferring the large gloomy hoghouse or building where the whole herd may be kept under one roof, and where the bedding, feed, water and everything pertaining to the comfort of the animals may be kept convenient and used with the least labor, and where all the work in caring for the herd may be done under cover. This plan has many advantages and where adopted the buildings should be so arranged that as much sunlight as possible may be admitted to the pens and feeding floors. There are other breeders who prefer the outdoor individual house large enough for only one sow and her litter, with a grass lot of at least one-half acre where the sow and pigs may always be by themselves. This latter plan will of course occupy considerable land, at least where the herd is large, and will necessitate considerable fencing into lots along either side of a lane and the hauling of all the feed to the different lots at each feeding time. But this plan insures both abundant pasture for the sow and litter as well as plenty of room for the necessary exercise and has the advantage of always affording clean quarters for the hogs.

There are many different plans for both the large houses and small individual houses, from which may be selected whatever best pleases the breeder. As much or little expense may be put into the building of hoghouses as the breeder desires.

All buildings used for breeding and feeding swine should be strongly built and made of good material, and all should have floors both for feeding and sleeping apartments. Floors made of wood are preferable in the sleeping quarters, being warmer and more easily kept dry. Where the large hoghouse is used many prefer the feeding floor to be constructed of concrete or cement and the sleeping floor of wood. Where the building is used for the feeding of a large number of swine together some prefer the feeding floor to be constructed along the outside of the building, and in such instances the floor should be constructed of concrete or cement, raised slightly above the surrounding surface. A cement feeding floor of this kind properly made would be practically indestructible and would be easily kept clean either by sweeping or flushing with water.

Where the individual system of houses is used there is no necessity for a feeding floor except a small one about 8′ x 8′ in one corner of the lot most convenient to feed, and this only for the use of the litter where the pigs may be fed secure from the intrusion of the mother. She may be fed near them from a single trough.

Where the individual houses are used it will be necessary to have a feedhouse or building so arranged that all feed may be kept there in separate bins; where water may be easily obtained either from an elevated tank or from a pump in the building and where the mixing of the feed may be done. With this system the easiest way to distribute the feed to the various lots is to use a wagon not to exceed 12″ in height from the ground, and large enough to hold three or four barrels of feed set upon it. Such a wagon with a pair of shafts and a gentle horse kept for the purpose of hauling all feed and water to the different lots make it very easy for the feeder to care for 100 or 200 hogs in a short time with very little labor.

Where the feeding is all done in one building or house a feed carrier suspended from a steel track above the alley is the most convenient way to handle the feed, as it requires but very little effort to carry a large amount of feed in this manner along the alley.

There are many kinds of troughs on the market. Some of them are good, others better and some absolutely worthless. Old-fashioned wooden troughs are about past. They are expensive because so soon destroyed, and are always damp and convenient for animals to put their feet in while eating. There are several types of galvanized iron troughs as well as two or three cast iron troughs. One of the latter is made for animals of any size and is absolutely unbreakable. This trough weighs 120 pounds, is round and accommodates eight animals, and whether small or large animals they are never crowded, as the trough forms a circle. A hog or pig cannot get his feet into it, for the reason that he eats out of a cup just large enough to stick his nose in. These cups are filled from the center in a receptacle where the feed falls on a cone, thus being evenly distributed to the eight individual cups which are separated by a heavy iron rod, and the pigs can eat only from the cup before them. These troughs are always clean, having no place for the feed to lodge and become foul. This style of trough possibly is not suited to pens along a feeding alley in a building, but for outdoor use it is admirable for feeding slop. The matter of feed troughs is of great importance, as all feed fed in the condition of a slop or mush should be fed in good troughs easily kept clean. No feed should ever be fed on the ground, unless it may be ear corn where the ground is frozen or is hard and smooth.

A breeding crate should always be used. This is an important matter. By this method of breeding the number on the ear tag or the ear mark may be taken and entered in a book at the time of breeding, giving day and date. There are several kinds of breedings crates and the breeder can easily learn which is best for his purpose.

Another necessary fixture on the swine breeding farm is a good dipping tank. This is of great value not only for the purpose of disinfecting swine, destroying vermin and mange but in keeping the skin and hair in a healthy condition. Such a tank sunk into the ground with a chute from an incline where the animals slide down into it and have to swim through the dip will pay on any pure-bred swine farm. It is of great value in preventing disease.

Another valuable appurtenance is a first-class feed steamer. It is generally admitted that while cooked or steamed feed is of no advantage so far as economy or nutriment is concerned it is of great value in the feeding of young pigs during the cold months, as young pigs fed on warm feed either cooked or scalded with hot water thrive almost as well during cold months as through the warm weather. It also is of value in feeding brood sows during the winter season, as a mixture of clover hay, or where possible alfalfa, run through a feed cutter and mixed with meal, bran or middlings and steamed or mixed with hot water is an ideal feed for brood sows.

THE MORGAN HOG BARN.

F. W. Morgan's hog barn on his Wisconsin farm is a T-shaped balloon-frame building, ceiled on the inside and outside, and has a shingle roof. (See Fig. 142.) It is 280′ wide and

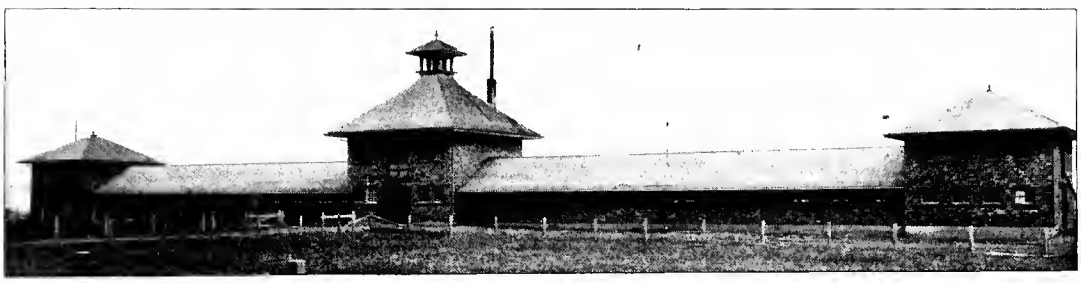


FIG. 142—MORGAN HOG BARN (FRONT ELEVATION).

extends back 130′. There are in all 52 pens, each with a small rustling box for winter use and an outdoor addition extending back 24′. There is a 9′ shed roof extending from the barn proper over this. Each outdoor pen has a cement wallowing trough, so that each hog gets two rooms and a bath. At each end of the barn are rooms 24′ square and 20′ high, which are kept at an even temperature during the winter, and are very useful in the case of young pigs. The entire floor is of cement. The large room in the center is 30′ square and 24′ high. It is supported by truss work inside so as to be entirely open. It is used as an engine and mixing room. Fig. 143 shows the details of interior arrangement.

A NEBRASKA HOG-HOUSE.

The hog-house erected by McKelvie & Son of Nebraska faces south and is 24′ x 36′. It stands on level ground and is built on a brick wall 2′ 6″ high and the space underneath the building is utilized for shade in the summer and makes a warm sleeping room for cold weather. There are

two doors in the south wall, also two directly opposite in the north wall. The north doors are closed in the winter and the late summer and fall pigs that are weaned run in there to sleep, having the space divided so that the fall pigs take

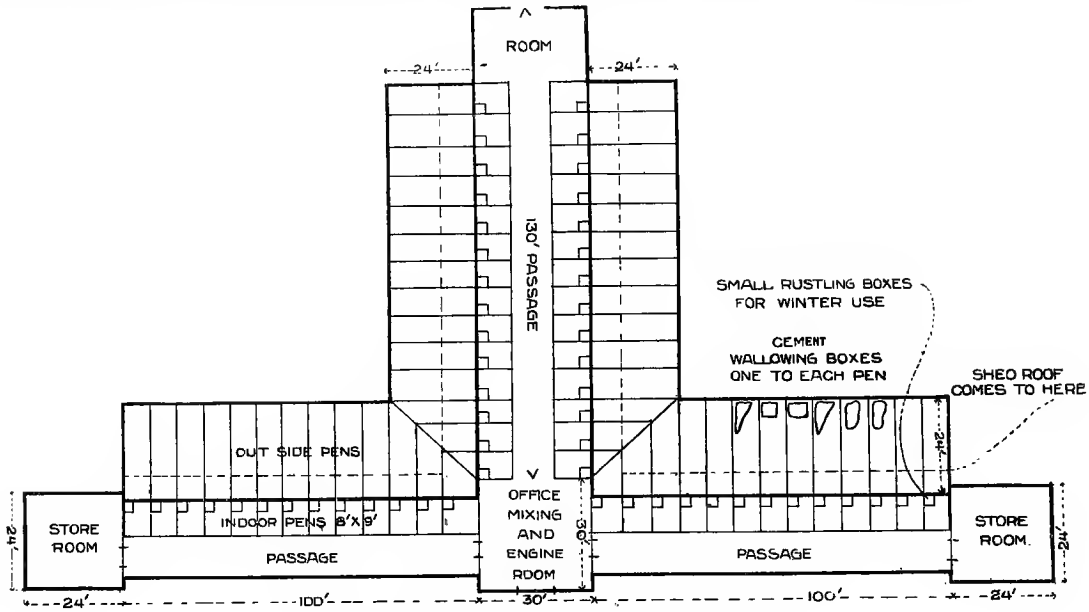


FIG. 143—MORGAN HOG BARN (GROUND PLAN).

one-half and the summer ones the other half. By opening all the doors in the summer the pigs are enabled to get in out of the extreme heat and the flooring of the house gets thoroughly dried.

on this was put building paper and then the best 6″ drop siding. This makes a wall that wind does not blow through. Tar paper also was used under the shingles. This makes a warm roof and keeps the wind and fine snow from driving through. Besides it gives a warm building which is ventilated by raising one or more of the upper windows shown in Fig. 144. The north roof is 17′ long and the south roof is 12′ long. The

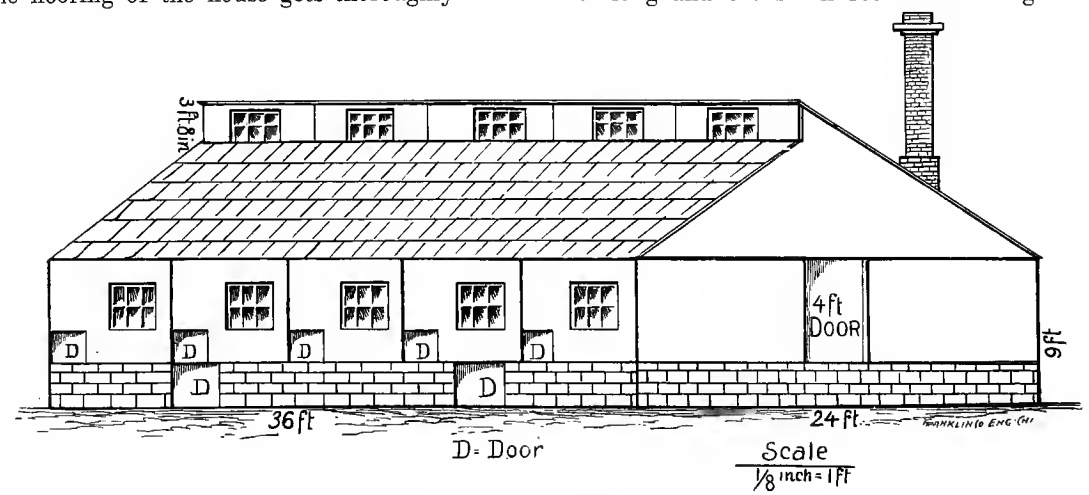


FIG. 144—A NEBRASKA HOG HOUSE.

The flooring of the building is made of 1″ lumber and doubled and the stuff used should be clear of knots so there will be no leaks to let water through. The sides of the building are also double. The first is common sheeting and

offset in the roof where the windows are set in to give light for the north pens is 3′ 8″. This is the space between the roofs. A larger window can be used here if so desired.

The interior is divided as follows: A 4′ aisle

runs through the long way east and west, leaving 10′ on each side to divide up into pens. This divides it into five pens on each side, two of each five being 6′ x 10′ and three 8′ x 10′ with a door to each pen. One pen is used for stove and bunk. By the construction of the front and roof as shown sunshine is admitted in the pens during the greater part of the day, particularly during the middle of the day, when it is most beneficial. The pens are made of movable partitions, so that if desired one or all of them can be raised and the entire floor used for feeding. It makes a very good place to fatten hogs during the winter in case it happens that it is not wanted as a breeding-house, as less feed is needed to keep up the animal heat. The chimney or flue is at one end and 2′ north of the aisle. The stove is at the other end and the pipe runs the length of the building and heats it with very little fuel. Where the cost of fuel is not much of an object heating could be done with steam. Where a steam cooker is used the building can be heated conveniently and very evenly. The hogs get into the house by approaches (not shown in the illustration) made to lead to each door and are 8′ long, one end resting on the ground and the other end just below the door. This makes a gradual slope and the hogs walk up easily on the slats which prevent their slipping.

This is an all-purpose hoghouse and a farrowing place in particular, where no matter what the weather the litters can be saved. After the pigs are farrowed and a few days old and the weather will admit they are hustled out on the ground into lots of about one-eighth of an acre, which are provided with small houses 7′ x 7′ made of shiplap 5′ on south and 2′ 4″ on north, with a drop door in the south side to let in the sunshine. Here they are kept for a time, one sow and litter to a lot. Here they have the ground to run on, which, like daylight and sunshine, is essential. These small houses and yards are all that are required for pigs during mild weather, but for early or late fall pigs it would no doubt pay to build such a house as described. The cost of this building was about $250.

AN ILLINOIS HOG HOUSE.

The peculiar feature of the windows at the apex of the roof serves to admit, in the early spring, the warm rays of the sun on the north row of pens, the south row being lighted by the lower tier of windows, thus affording a sun-bath to all the occupants, the value of which in swine-culture is well known. (See Fig. 147.)

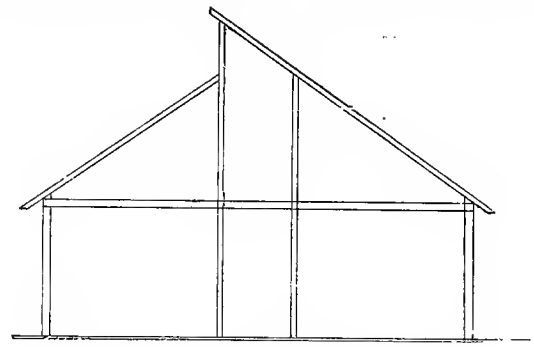


FIG. 145—AN ILLINOIS HOG HOUSE (FRAME).

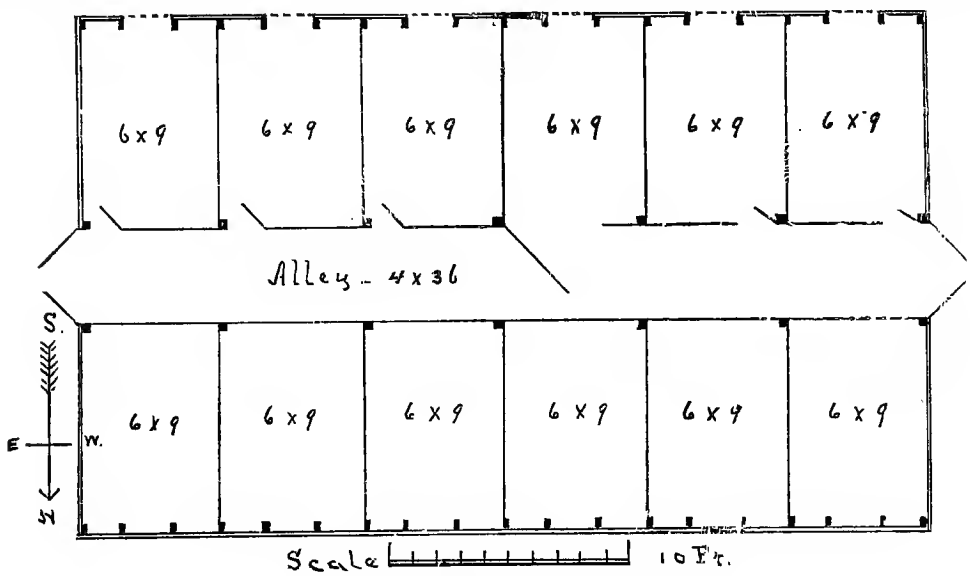


FIG. 146—AN ILLINOIS HOG HOUSE (GROUND PLAN).

The foundation is made of blocks of stone which are laid about 4′ apart. Sill beams are of 6″ x 6″ lumber. The frame consists of 2″ x 6″ scantlings placed 2′ apart and which are 7′ high. There are two rows of 4″ x 4″ posts—one on each side the alley, 6′ apart, extending to and supporting the roof—as shown in Fig. 146. Girts of 2″ x 6″ go across every 6′. Plate beams consist of a 2″ x 6″ and 2″ x 4″ spiked together. Rafters are 2″ x 4″ and 2′ 6″ apart. The roof is one-third pitch (see Fig. 145) and is made of sheeting and shingles. Sides are of drop-matched 6″ siding. Eaves and gables project 13″. Floor joists are 2″ x 8″ and 2′ apart. Floor of 2″ plank. Windows are 2′ by 2′ 3″. Those above are made to slide sideways and the lower ones up and down. All the partitions are movable drop partitions except those adjoining south side of alley and the middle cross partition. The total cost of this building was about $200.

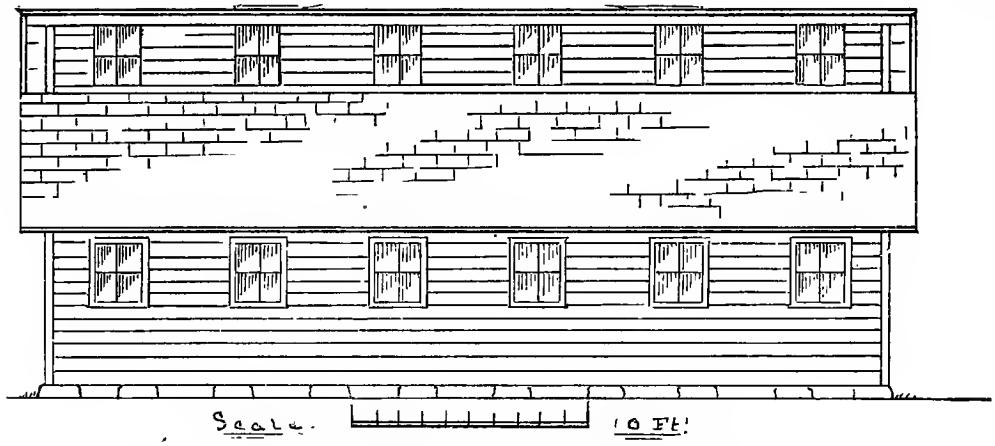


FIG. 147—AN ILLINOIS HOG HOUSE (SIDE ELEVATION).

HOG HOUSE FOR SOWS AND PIGS.

The hog-house shown in Figs. 148 and 149 is intended for sows to farrow in. Pigs when weaned may also be fed in it. This house is 68′ x 30′; stalls are 6′ wide and 10′ deep, a row on each side; this leaves 10′ in the center for a feeding floor to feed young pigs on and two bins on each side at the north end for feed 8′ x 10′ and a mixing room 8′ x 10′ for cooker. Water is to be piped to mixing room, concrete is to extend from A to B. The object of the concrete not extending all over the whole floor is to have 5′ of dirt at the back end of each stall for pigs and sows to lie on.

HOUSE FOR TWENTY SOWS.

The house (shown in Figs. 150 and 151) for 20 brood sows is practically rat-proof. The plan shows a row of feeding pens around the building, which means a concrete floor all around the building. This floor is on the level of the board floor in the breeding or sleeping stall and the concrete in the alleyway through the center of the house. The concrete feeding floor and alleyways are to be built first and with a fall of 2″ in the length of the building to give drainage so that the alleyway may be flushed out often. In extremely cold or stormy weather it may be desirable to feed and slop the sows in the sleeping pens. Some may object to the plan of board floor for the sleeping stalls, but experience shows that

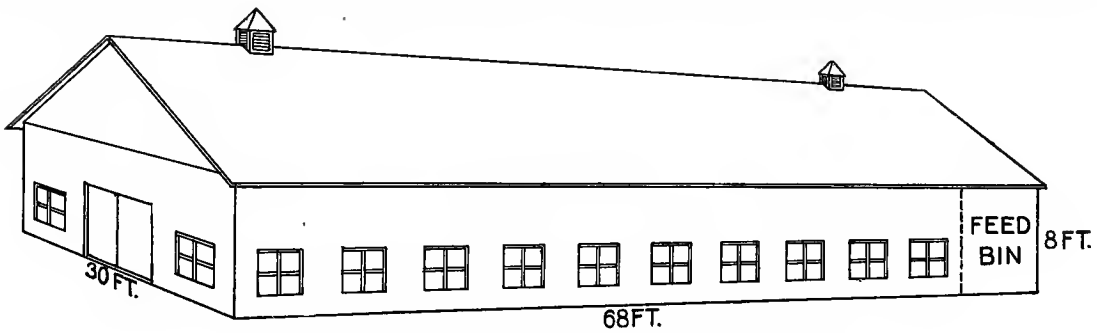


FIG. 148—HOG HOUSE FOR SOWS AND PIGS (SIDE ELEVATION).

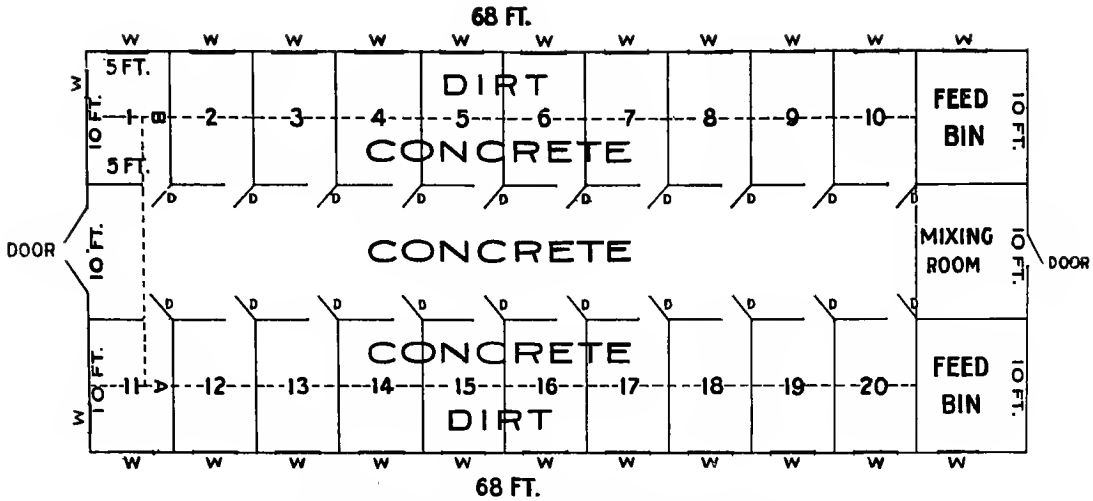


FIG. 149 HOG HOUSE FOR SOWS AND PIGS (GROUND PLAN).

sows and pigs are warmer and require less bedding on the board floor than on concrete.

In building fill the spaces under the floor with cinders or coarse sand or fine gravel and in this lay the nail ties for the floor, so that the cinders or sand will fill the space completely up to the floor. This makes the floor solid, warm, dry and effectually shuts out rats, as they can not burrow

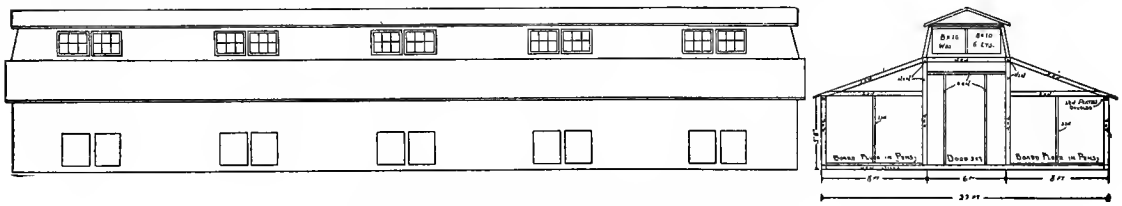


FIG. 150—HOUSE FOR TWENTY SOWS (ELEVATION).

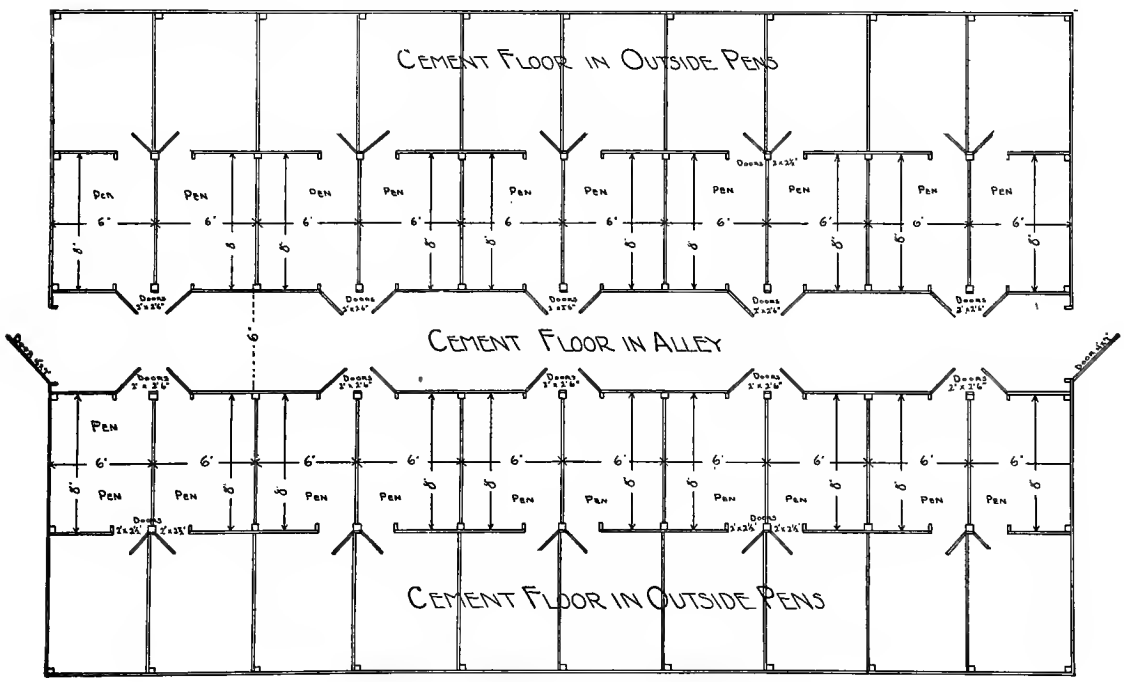


FIG. 151—HOUSE FOR TWENTY SOWS (FLOOR PLAN).

in cinders. The cinders should be at least 6″ deep; deeper is better. The durability of the concrete floors depends on the construction. A poorly-built concrete floor is short-lived; a well-built one is practically as lasting as granite. The concrete and board floors can all be made before the building is erected, but one will have a firmer building and fences to erect the frame of the building and set posts for the outside fence before laying concrete.

The plan of construction gives sizes and lengths of material, so that any handy farmer can do the carpenter work. The siding is what is called patent siding, tongued and grooved. It should be well dried before it is put on. It is covered with redwood shingles. The sash have six lights, each 8″ x 10″; they can be bought ready glazed. The plan shows them in pairs. To get a better distribution of sunlight they should be distributed so as to divide the dead space equally between windows. The deck sides are not perpendicular but have an 8″ slope in the 2½′ of height, thus admitting more direct rays of the sun. By this arrangement of sash one can have sunlight in every corner of the house and by hinging half of the sash and elevating or lowering it as in a green-house one can have almost complete ventilation.

By doors opening into the alley one can change or sort the sows or pigs readily and from the end or side doors sows can pass to as many different grass lots or fields as are available. If one wants fire in the house for heating it or making slop he can arrange that in the alley and have a flue put in the deck when building. More space for stove or boiler may be had in the center of the house by setting the partition of a stall on each side back one foot, thus making two small stalls 6′ x 7′ and stove space 8′ x 8′. In building every other partition of stalls may be made movable, but this is a matter for each man to settle for himself. A cistern or drive-well will add to the convenience and place water at hand.

The cost of the building not painted will be about $200. This plan places the health of the herd above the convenience of the herdsman. Sanitary conditions are the first requisite of health and these mean plenty of sunlight, pure air and clean dry sleeping places. The cement floor outside favors a clean house inside, reduces inroads of filth and rats and adds to the comfort of the sows and pigs.

FARROWING PEN FOR EARLY LITTERS.

For warmth, sunlight and convenience the farrowing pen shown in Fig. 152 is unexcelled. Its foundation is on stone pillars. The joists are 2″ x 6″ by 20′ long; the floor is tight. The south side is 6½′ to the eave; north side 4′ 8″ to eave; highest point of house, 12′; 4″ x 4″ corner posts and also to roof in center. The sides are all

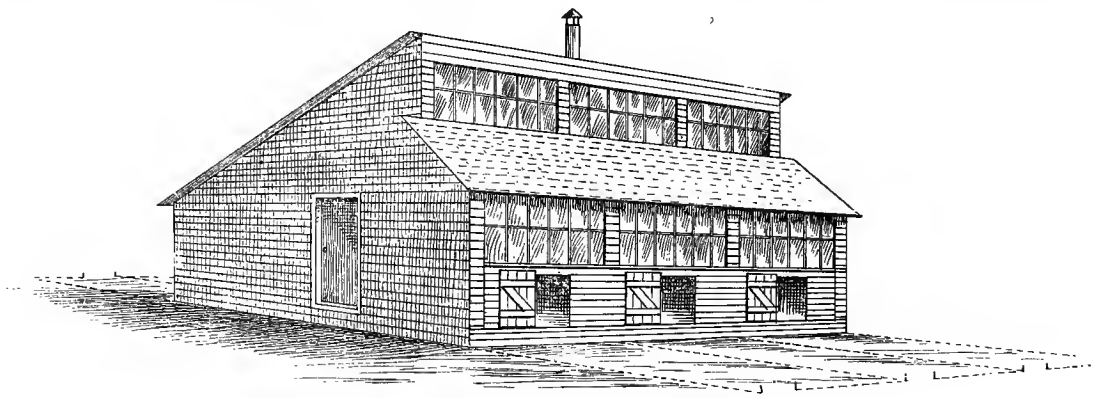


FIG. 152—FARROWING PEN FOR EARLY LITTERS (FRONT VIEW).

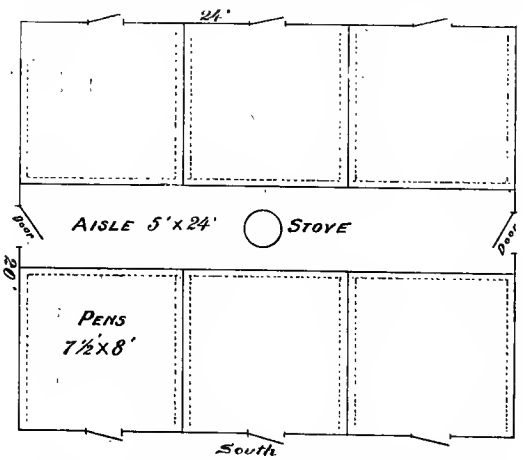


FIG. 153—FARROWING PEN FOR EARLY LITTERS (PLAN).

boxed tightly, papered and weather-boarded. The roof is sheeted down solid, papered and shingled with best shingles. Sash are 2½′ x 6½′ each. The partitions and doors are made of matched

FIG. 154—LOVEJOY FARROWING PENS (FRONT VIEW).

flooring and are 33″ high and movable. The dotted lines around each farrowing pen (Fig. 153) are a 2″ x 4″ hardwood scantling with bottom 8″ from floor and with inside 8″ from partition. The great advantage of using matched flooring for partitions is it prevents one sow from knowing what her next neighbor is doing and one disturbs the other but little. A pen 8′ x 16′

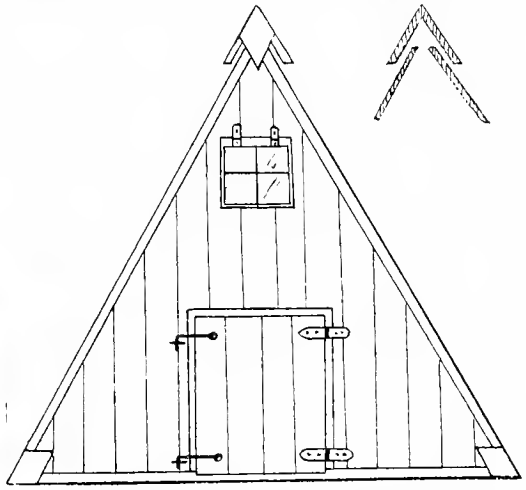


FIG. 155—LOVEJOY FARROWING PEN (CONSTRUCTION).

for each farrowing pen is on the outside of the house, and is made so one pig cannot get in his neighbor's pen, thus allowing the sow to be fed outside of the house and exercise for sow and pigs

FIG. 156—A PORTABLE PIG PEN (COMPLETE).

when the weather will admit. The cost of this house complete was about $125.

LOVEJOY FARROWING PENS.

These pens or portable houses (Fig. 154), designed by A. J. Lovejoy of Illinois, are each situated in the middle of an acre lot and on either side of a driveway, the divisions being made by the use of wire fencing. The houses are 8′ square. Four 16′ boards make the floor, and the roof and sides are made of matched flooring, lined with building paper, and that covered on the inside with common lumber. The houses are set to front south. There is a door in both north and south ends and a window in the south end, the latter being hinged at the top with rope and pulley attached so that it can be swung up out of the way when it is open. In cold weather and early spring the north door is closed, and if necessary the south openings also are closed, fresh air being secured through the ventilator in the roof that is made by carrying the ridge a trifle higher than the sides that comprise the roof. This is shown clearly in Fig. 155.

In hot weather the houses are converted into summer resorts by leaving both doors and window open. Each house is nicely painted with two coats and trimmed in white, and costs complete about $10. They are set up on blocks in the summer to keep the floors dry and in the winter time they are dropped to the ground and banked to keep the wind out from under the floor.

A PORTABLE PIG PEN.

The primary object of this pig house (Figs. 156 and 157) is to secure shelter, warmth, sunshine and pure air at reasonable cost, and the secondary object is to have it as handy for feeding and handling the sows and pigs as possible. L. N. Bonham of Ohio perfected this plan.

This house is 5′ x 6′. Four scantlings 2″ x 2″ x 12′ and two scantlings 2″ x 4″ x 12′ will make the frame and roof supports. The bottom rail is 2″ x 4″, the others 2″ x 2″. The three pieces for the roof are cut 6′ 6″ to give a 3″ projection of roof beyond the sides.

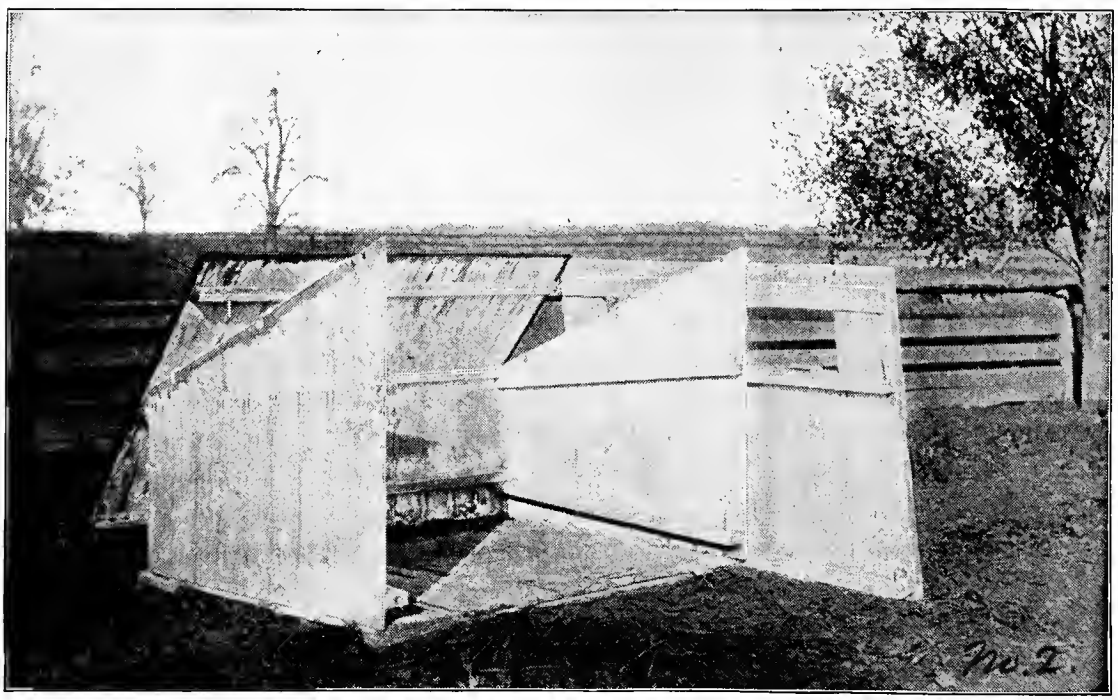


FIG. 157—A PORTABLE PIG PEN (TOP AND FRONT OFF)

Fig. 156 shows the house set up and the drop window partly down. Fig. 157 shows the top off. The construction is readily seen. After the house is ready to set together have the floor made just large enough to let the sides of the house set outside the floor. The cost of this house is about $5. It pays to paint the roof every three years but the sides will last without paint as long as the roof will painted. Taken down each fall and spring and whitewashed and set up against a

fence or in a shed until needed it will give long service.

PIG HOUSES AND FEEDING FLOOR.

The floor shown in Fig. 158 is made of 6″ flooring as free from sap and loose knots as it is possible to secure it, and nailed every two feet to the 2″ x 3″ nail ties. On the ends and sides of the floor joists 2″ x 8″ are set on edge, over which the floor laps. These joists keep the cinders in and the edges of the floor solid. On such a floor one can drive a team without injury to the floor. With a fall of 2″ in 16′ there is good drainage and it is easy to clean.

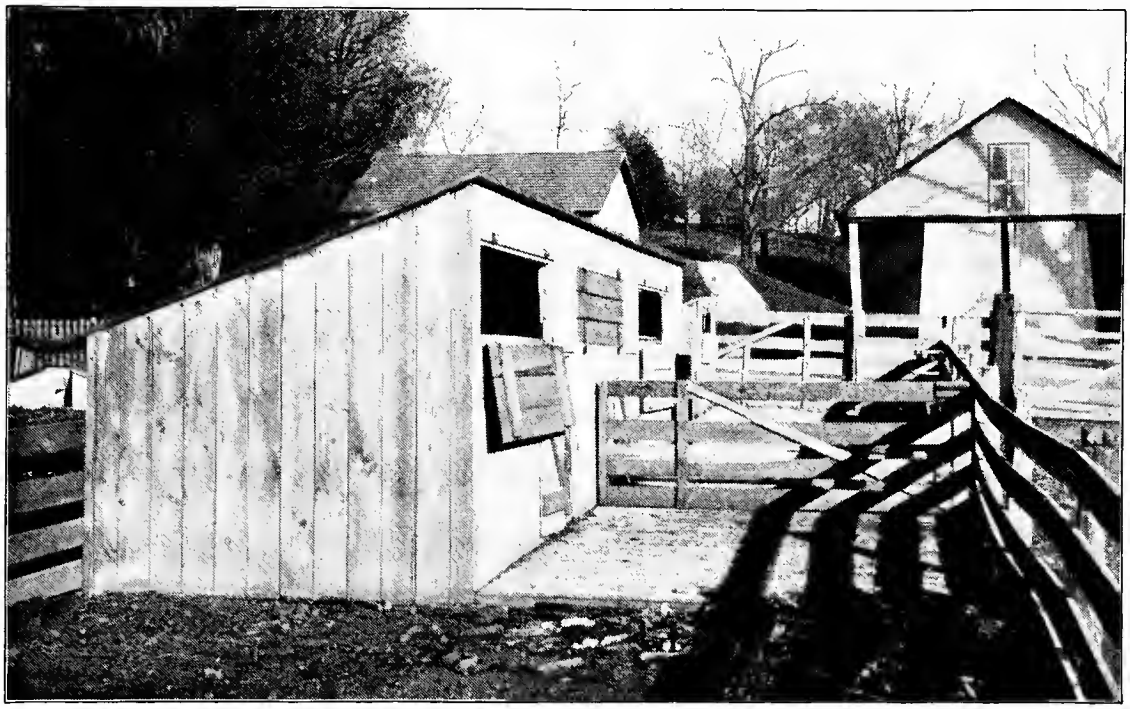


FIG. 158—PIG HOUSES AND FEEDING FLOOR.

The feeding and slopping are done on the floor outside the houses, as this is the only way to keep the pen dry and free from droppings. The size of the pens, 6′ x 7′, also favors this. If the pens are much larger the pigs will use a corner for droppings and keep the floor wet and air foul.

The space on the floor in front of the pens is divided by gates, so the sows and litters are kept separate the first week or two until they begin to want to go out onto blue-grass. After that the gates are swung back against the fence and the sows and pigs are encouraged to go out every bright day.

It is surprising how soon these floors are dry and warm after snow storms if the floors are cleaned off before the snow is packed. The clean dry feeding floor invites the pigs out many an hour when pigs in the average pen will not venture out. If one has three or four sows to farrow the same week he can put them in these pens and make them more comfortable than in the large house. If but one or two sows farrow in the same week they are assigned to the single houses located at convenient places for good sanitary surroundings.

With this floor 16′ x 48′ there is room for four of these houses and floor room left sufficient for feeding 50 shotes.

PLAN FOR MOVABLE HOG HOUSE.

The hog houses used at the Iowa Experiment Station are made as indicated in Fig. 159. The dimensions are 8′ square, with 2′ 8″ corner posts and 5′ rafters. The pen is supported by five 2″ x 4″s running from end to end and sawed slanting at the front end, the two outside pieces having holes for attaching a rope, thus enabling the house to be drawn by a team and placed in different locations when desired. The floor is made from four rough boards 1″ x 12″ x 16′ cut in the center, and the roof is made of grooved roof boards 1″ x 10″ x 12′, cut in the center. The sides and ends are made of 8″ drop siding and the pen when complete is given two coats of

paint. All dimension pieces are of 2″ x 4″. The roof window is 2′ x 5′ and covered by a hinged section of the roof the same width, which may be open or closed to admit or exclude sunshine. The door is 2′ 6″ by 2′ 8″, and the opposite end contains a gable window 2′ by 21″ for light and ventilation. The pen complete, including windows and painted two coats will cost about $12. After the pigs are old enough for the sows to be turned together as many as three sows and eighteen pigs may be accommodated without difficulty in one of these pens.

They may also be used for fattening hogs and for this purpose they possess some important ad-

FIG. 159—MOVABLE HOG HOUSE.

vantages over larger apartments or shed room, chief among which is that they can be readily moved and placed where desired and also that pens of this size prevent the hogs from piling up and injury by overcrowding. Another point is that this system permits the hogs to be moved readily to clean fresh quarters as often as may be desired. This is the most effective way of disinfecting after a scourge of hog cholera. This system of handling hogs may be modified as experience or varying conditions dictate.

A MARYLAND HOG HOUSE.

Neither corn nor pork can be successfully produced without plenty of sunshine. In the North this sunshine in winter will have to be brought into the pens through glass. In more Southern latitudes under normal conditions it is only necessary to face the pen to the south; allow the sun's rays to reach to the back of the pen on the beds and give good shelter and protect from the north and west winds.

The end elevation and floor plans, designed by the Maryland Experiment Station, give almost a complete idea of the pen at that station which has met with very general favor. A few of the special points in construction are thus given:

1. It is faced to the south (Fig. 160) so as to permit the rays of the sun to shine on the beds

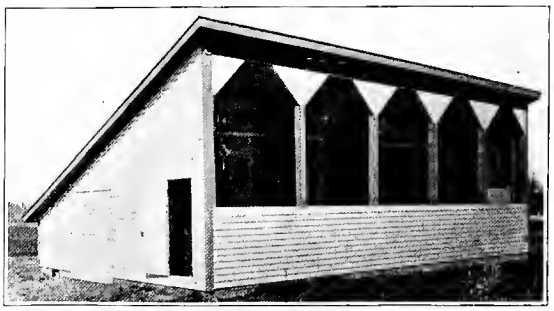


FIG. 160—A MARYLAND HOG HOUSE (FRONT ELEVATION).

of the pigs at the extreme rear end of the pen in the winter season and also to give shade in that portion in summer. 2. The lattice construction

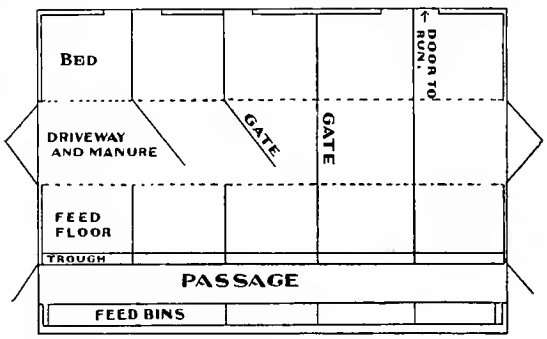


FIG. 161—A MARYLAND HOG HOUSE (INTERIOR ARRANGEMENT).

between the pens at the ends and rear admits of a free circulation of air in warm weather. 3. The location of the manure pit (see Fig. 161) in the

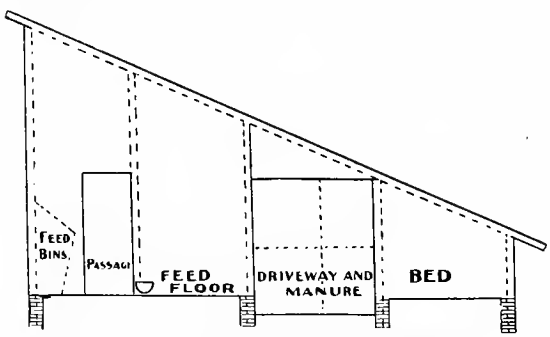


FIG. 162—A MARYLAND HOG HOUSE (SIDE SECTION).

center and below the level of the sleeping and feeding floors with all drainage toward it aids materially in maintaining a proper sanitary condition. 4. The ease and facility with which the

manure can be removed. 5. The swinging gates close the pigs into their beds while the manure is being loaded. 6. The swinging fronts to the pens permit the food to be easily placed in the trough and evenly distributed so that the pigs have an equal chance at feeding time. 7. The manure pit is concreted, which enables the saving of all liquid excrements, which with the pig amounts to 51 per cent of the total manure value. 8. Ease of changing pigs from pen to pen. 9. Feed bins are placed in front of each pen which facilitates feeding and enables keeping different feeds for each pen if desired. (See Fig. 162.) 10. The general plan can be used and the dimensions and materials modified so as to meet the demand of circumstances.

SHEEP BARNS AND SHEDS.

In the old world there is little housing of sheep. In England many flocks are in the open the year round; in France they are housed and artificially fed winter and summer in some parts, mainly no doubt because of the great value of the land and the cheap labor. In America cold winters, drenching storms and intense summer heat are encountered so that there is in the region north of Tennessee and east of Colorado need for provision for shelter.

Inexperienced flockmasters err in making too careful provision for shelter. Sheep need to be dry and out of the wind—that is all. Many expensive sheep barns fail because of lack of fresh air. Sheep have been fed in these expensive barns at a loss and in later years they have been fed in the open yard alongside the barn, the feed being stored within, at a profit.

The sheep is not a hardy animal. A native of mountainous regions it is used to having its lungs full of pure fresh air. Deprived of this no amount of feed or coaxing will make it thrive. Some one has said that "the worst enemy of a sheep in the barn is another sheep." The sheep barn then needs primarily two things: a watertight roof and provision for the entrance of an abundance of fresh air. Add to these things provision for storing a large amount of forage and a supply of pure water and the sheep barn should prove satisfactory, whether it is built cheaply or expensively.

Perhaps the best manner of ventilation is by having all of two sides provided with continuous doors, divided horizontally, the lower half swinging outward like a gate, the upper half lifting up horizontally, as a box lid lifts, and held up by props hinged to the door. These doors may then be opened slightly to admit some air during a blizzard, wider on a cold day, entirely up whenever the weather is warm and the air sluggish, and one side may be left wide open at all times. It is better to leave off the upper doors altogether, leaving mere open spaces there, than provide doors and then forget to open them.

Sheep bear crowding together in the fattening flock and six square feet of floor space to a fattening lamb eight months old is ample. Twice that will suffice for a pregnant ewe. To crowd them without providing fresh air is of course to be avoided.

Movable racks are best. Make them of such length that they may be set to form partitions in the barn. The most economical hay-racks are those in which the sheep thrusts its head in between the slats, then eats without pulling the hay out and trampling it beneath the feet. Try to prevent this waste by making very narrow slats and the waste is doubled, as all hay is first drawn through the narrow spaces before being consumed and very much of it is wasted. Provide plenty of racks, so that every lamb can eat at the same time. It matters little how many sheep are kept in a pen if the air and water are pure and each lamb has a chance to eat at will. Certainly in the breeding flock there must be separate pens for the ewes advanced in pregnancy and many small pens for ewes that have lambed. These pens may be built of simple tight panels about 4′ high and 5′ long, two panels hinged together and when opened at right angles and hooked into a corner of the room they form the other two sides of a very convenient small pen.

A small yard paved or concreted attached to the sheep barn is indispensable. Do not make it large, as it will cause loss of droppings and be more difficult to keep dry.

The fattening flock should be confined to the barn at all times save when feed is being put in; then it is convenient to run them in the yard. In this way the saving of manure is material and the lambs or sheep fatten faster to have little exercise. There should be provided inside a flood of pure air for them.

Water should be in abundant supply and so

convenient of access that the sheep have no difficulty at any time in satisfying their thirst. It should be kept pure enough for man's use. Sheep are dainty in their appetites and readily detect foulness in the water.

When the sheds are kept well littered with dry straw there is no harm in permitting the manure to accumulate to considerable depth. The tread of the sheeps' feet prevents its heating and all is saved. It should be hauled out, however, as fast as the condition of the fields will allow and all cleaned out on the approach of warm weather. Sheep manure being rich in nitrogen it is good economy to sprinkle the barn frequently with finely ground phosphate rock or phosphate flour or with acidulated rock or acid phosphate. Applying the manure to the land with a manure spreader it may be put on more thinly when so treated. The manure from sheep barns forms a considerable source of profit and has made some farms famous.

A dipping tank is part of the indispensable sheep barn furniture. It may be of galvanized iron or cement. It may be 16″ wide at the top, 8″ at the bottom, 4′ long at the bottom and 10′ at the top, giving an incline on which sheep may walk out. All sheep that have traveled on cars are probably infected with scab germs. Dip them thoroughly before they go into the sheds. Turn them in wet and allow them to rub their wet sides against the posts and racks. All home sheep are apt to be ticky. Dip them once a year and the ticks may be eradicated. There is no stock on the farm more miserable than poorly cared-for sheep.

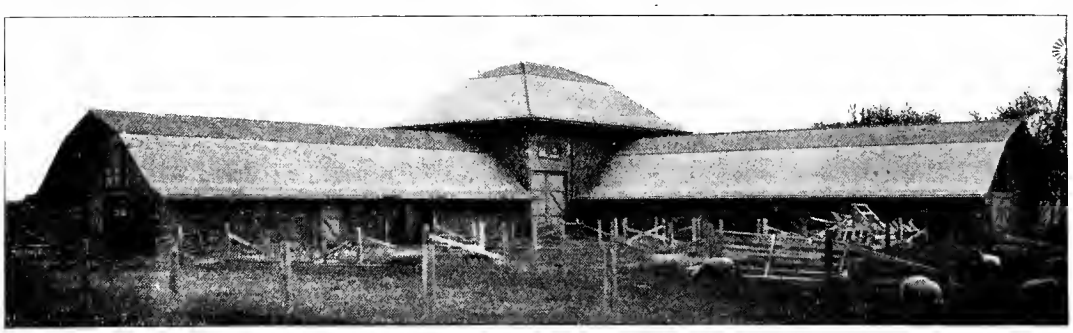


FIG. 163—THE MORGAN SHEEP BARN (REAR ELEVATION).

THE MORGAN SHEEP BARN.

This barn built by F. W. Morgan in Wisconsin is of ordinary balloon frame construction ceiled on inside and outside with shingle roof. (Fig. 163.) It is 182′ wide by 155′ long in the shape of a cross. The entire floor is of grout construction. In the front is a shearing and engine room and in one corner of the center of the barn is a small turnip house. On all sides of the barn are hay self-feeders. The wings are 32′ wide.

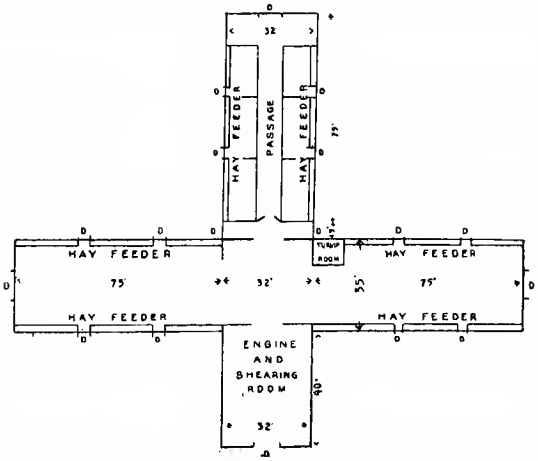


FIG. 164—THE MORGAN SHEEP BARN (GROUND PLAN).

The plan shown in Fig. 164 gives a clear idea as to arrangement.

A NEBRASKA SHEEP BARN.

On a Nebraska farm where from 5,000 to 7,000 lambs annually are raised two large barns have been constructed according to the affixed plans.

The barn in which the greater number of the lambs are dropped is shown in the ground plan, Fig. 165. There is a loft above in which hay is stored and chutes down which it is thrown to be fed in the permanent hay-rack shown. This hay-rack partitions off the space so that the central part is used for one class of ewes, generally the ones least advanced in pregnancy, while those showing nearness to lambing are placed in the outer space.

The small pens on three sides of the barn are for the reception of ewes after lambing or in some cases before lambing. They are 4′ x 6′ in size furnished with convenient gates, with also a wooden trough communicating through the partition to furnish two pens with water, which is

carried in buckets. There is also a small feed trough to each pen.

The hay feeding arrangement is unique. At the outside of the building there is a bin-like addition with hinged lids that open upward, as shown in Fig. 165. This is the hay feeder. Partitions across the front keep the lambs out while allowing the hay to be pulled through readily. The hay is placed in the feeders from wagons along the outside. Where hay is generally stacked outdoors, this arrangement has much to commend it.

it. Allowing 12 sq. ft. to the ewe and lamb this barn will carry 2,000 ewes. It will not hold a liberal amount of hay for that number and the chief and only important defect of the building is its lack in height.

It is a question that must largely be settled by environment and individual preference whether this is a cheaper type of barn than the barn in which the hay is stored in lofts and the entire floor-space devoted to the sheep. In each of these barns hay is rapidly placed by machinery and horse-lifting. While no elevation of these

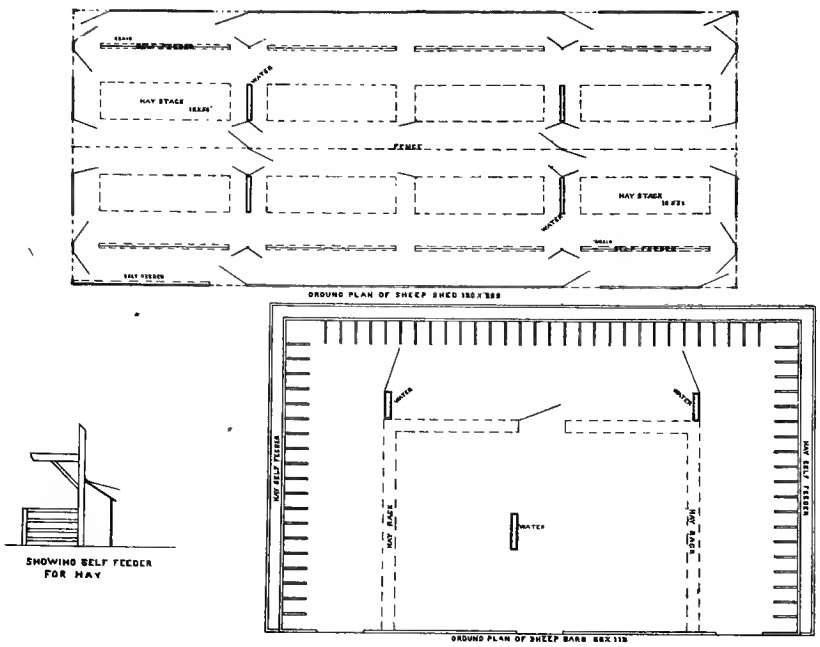


FIG. 165—A NEBRASKA SHEEP BARN.

Grain is fed the ewes before lambing in a small yard outside the barn. The dimensions of the building are 88′ x 112′. the basement story 10′ high, the mow should have a height of at least 10′ at the plates, making a 20′ post.

Fig. 165 shows a very large Western barn, the dimensions of which are 120′ x 288′. It is comparatively low, has no loft but instead is more in the nature of a covered yard. The hay is stacked in this building in long ricks or mows 16′ x 56′. There are eight of these ricks. The roof of the building rises in steps, there being plenty of windows and change of air through them, so that the light and ventilation are good. Self-feeders are provided in this barn so that winter lambs may be produced and old ewes fattened with their lambs.

A fence divides the barn lengthwise in the center and a system of gates is so conveniently arranged that sheep are very easily managed in

buildings is shown the intending builder can readily adapt another elevation to fit, choosing from among the forms of pole or joist frames.

EXPERIMENT STATION SHEEP BARN.

The sheep barn built several years since at the Wisconsin Experiment Station is believed to embrace many features worthy of general adoption by practical sheep-breeders and several points that are vitally essential to successful sheep husbandry are brought out.

The building (see Fig. 169) consists of a main part 24′ x 30′ two stories high, under the whole of which is a root cellar, and two wings reaching out at right angles from it. The east wing is 125′ long, 18′ wide and one story high. Only a part of this is shown in the cut.

The south wing is 100′ long, 18′ wide and two stories high. An alley or passageway 4′ wide is partitioned off along the entire west side of the

building by means of a low fence-like partition (see Fig. 166). This leaves a space 14′ wide and a little over 83′ in length, exclusive of a lambing-room that may be occupied by the flock as one large room, or it may be divided into any desired number of pens up to ten by means of a light but strongly-fastened panel that rests in grooves made for it at each end (see Fig. 167). These panels are easily managed and when placed in position are entirely secure without fastenings of any kind.

Since it has been explained how all the space in the shed may be used as one room, we will from now on consider the building as it is when divided into ten parts. Each pen is 8′ 4″ wide and is entered from the passageway through a sliding gate (see Fig. 167) that is suspended from a 2″ x 4″ scantling which is fastened in a horizontal position to the upright pieces of the passageway partition.

Each pen is provided with a low flat-bottomed trough for the feeding of grain and also a large

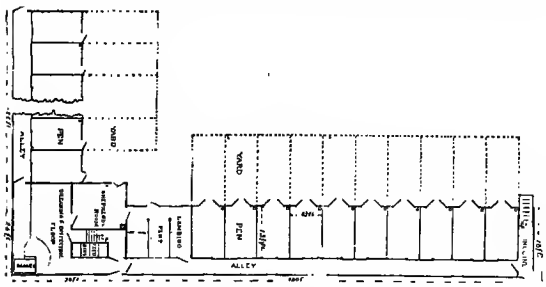


FIG. 166—EXPERIMENT STATION SHEEP BARN (PLAN).

hay or fodder rack, as see Fig. 168. This hay-rack is made with a tight front which prevents chaff and dust from falling into the eyes and fleece of the sheep while feeding and is also adjustable so that not only the angle of the front but the width of the opening at the bottom where the sheep throw the feed out may be changed to meet the necessities of the feed that is being used. The feeder or trough that is below the opening where the feed is drawn out serves an admirable purpose in catching all the finer parts of the hay or fodder that would otherwise be trampled under foot and wasted. This hay rack, as illustrated in Fig. 168, can easily be changed so as to meet the requirements of ordinary feeding by making it so that sheep can feed from both sides and long enough to reach across the shed. It may serve the double purpose of feed-rack and partition.

Experience has taught that adequate ventilation must be provided in all sheep buildings if trouble in their management would be avoided, and it appears that the building that is best adapted to the successful care of a flock is the one that may be the most readily and completely changed from an open to a closed shed according as the weather makes one or the other of the conditions essential. In recognition of these necessities each pen has double doors that when opened out into the yard make an opening that only lacks 38″ of being as wide as the pen. The manner in which these doors are operated and fastened may be seen in Fig. 167. One door is bolted securely at the top and bottom by bolts operated by a lever, as shown in the figure, and the other one fastened to it by means of an ordinary thumb-latch so that one or both doors may be opened at will. A slight upward movement of the lever allows both doors to swing open and when pushed shut a similar downward movement locks them safely.

Over these double doors are windows that are the same width as the doors and 2′ high. These windows are hinged at the top and are opened and closed from the passageway by means of a

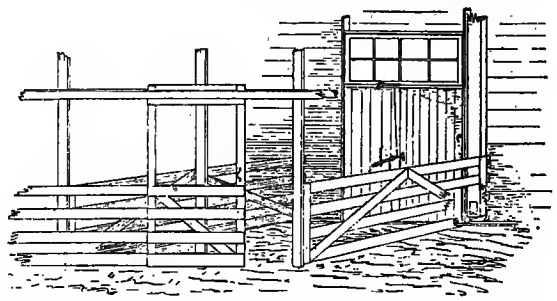


FIG. 167—EXPERIMENT STATION SHEEP BARN (SLIDING GATE).

rope that runs over two small pulleys. The windows are provided with a fastening device (Fig. 168) that works automatically. A pull on the rope from the passageway unlocks the window and raises it at the same time. When the rope is released the window closes and locks itself. Since the windows are operated from the hallway time is saved and annoyance and confusion to the sheep are prevented.

From what has been said it is easy to see how readily the barn may be converted into an open shed. If the weather is stormy but not cold the flock can be kept in the barn with the doors closed and the large windows left wide open, which will insure the admission of an abundance of fresh air without the bad results following the exposure to a draught directly upon their bodies. Should it become necessary to close the barn tight there still is ventilation by means of shafts that are constantly carrying off air from near the floor of each pen. These shafts (see Fig 167) are simple wooden boxes that start a foot from the floor and extend up through the roof as high as the peak. They are made by nailing two 8″ and

two 10″ boards together. Near the bottom on one side of the shaft is an opening for the admission of air, the flow of which can be regulated by a door that is hinged at the bottom and pushed into the shaft.

A lambing-room occupies the space of two pens in the partition adjoining the main barn. It is

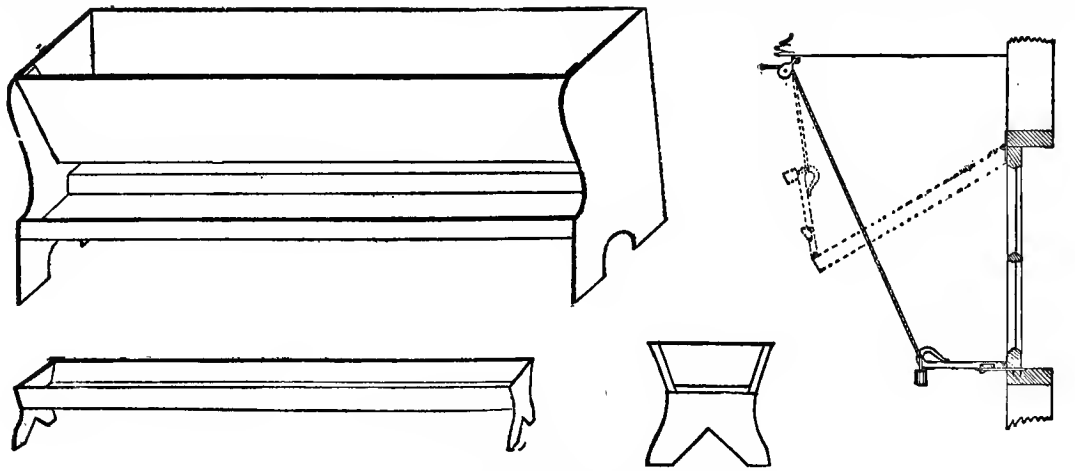


FIG. 168—EXPERIMENT STATION SHEEP BARN (HAYRACK).

14′ x 16⅔′. This room is inclosed by tight walls on all four sides, with an outside door and a door leading to the shepherd's room. The wall next to the alleyway and that next the first pen are provided with wide hanging doors hinged above, extending horizontally, which reach from about 2′ below the ceiling to a point 4′ above the floor. In cold weather they are fastened down; at other times they are swung to the ceiling, leaving the pen light and airy. By means of movable partitions this will accommodate six or eight ewes at lambing time.

The second story is also arranged for sheep. The floor is constructed of 1″ matched material with a coating of gas tar mopped on while hot. There are no permanent partitions of any kind upstairs. The space is divided by means of light fence panels. The sheep in going to and from the second story pass up and down through a chute at the end of the barn (Figs. 166 and 169).

The east or one-story wing has a 4′ passageway along the north side which leaves a room 14′ wide by 125′ in length. This may be occupied as one room or divided into any number of pens up to fifteen, which is the maximum. The gates and panels are similar to those described in the south wing.

A reference to Fig. 166 will show that the main barn is arranged to be convenient for both wings. The scales are located in the corner where the passageways from the wings meet. By this plan the sheep may be let out from any pen in either wing and driven along the passageway to the scales. The shepherd's room is in the southwest corner and by means of small windows in the partition a view of the whole interior of both wings may be had. A door from this room opens

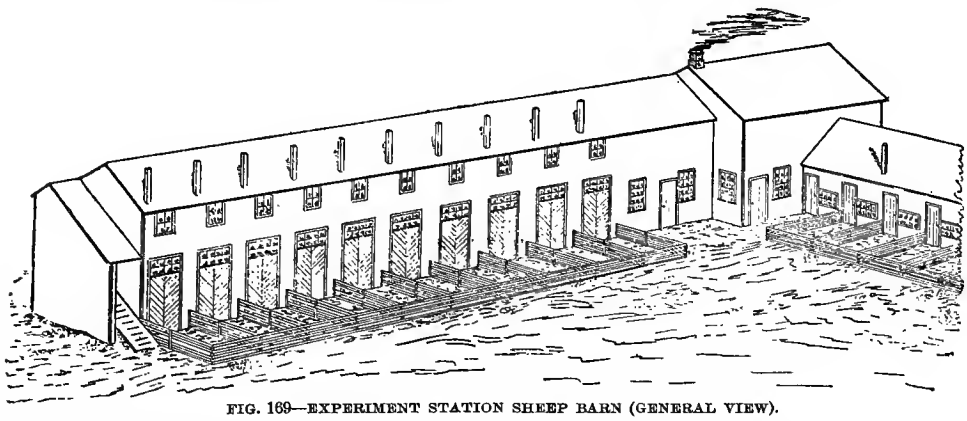


FIG. 169—EXPERIMENT STATION SHEEP BARN (GENERAL VIEW).

directly into the lambing-room and if necessary the lambing-room can be warmed from the shepherd's room.

The dotted lines beside the shearing and inspection floor in Fig. 166 represent a railing 3′ high that forms the passageway partition, and the space between this railing and the shepherd's room is used as a shearing floor. Feeding bins and stairways leading to the second story of the south wing and to the root cellar below occupy the rest of the space on this floor as shown in Fig. 166.

A BABY MUTTON FACTORY.

A moment's study of Figs. 170, 171 and 172 will show that the dominant ideas about the construction of this building were ventilation, light

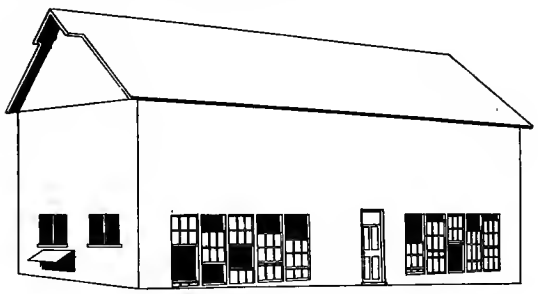


FIG. 170—A BABY MUTTON FACTORY (ELEVATION).

and sunshine—three things absolutely essential to success in growing baby mutton.

The building faces the southeast and is 26′ x 52′ with 16′ posts. The lower story is 7′, the upper 9′ and as the rafters have a rise of 10′ there is ample space for hay and fodder. The windows in front are 3′ x 6′ and the sash are raised and lowered at will. Those in the end are hinged to open inside. Around the back and northeast end above the nail tie are six doors each 24″ x 30″. A 10′ flap door admits the sheep without crowding.

During the winter there are often spells of warm, muggy weather which make ventilation a serious problem. At such times the small doors should be opened and the lower sash raised. This admits fresh air next the ground and any unpleasant odors are quickly dispelled. Every foot of floor space is utilized, and the hay racks are high enough from the ground to furnish resting places for the lambs. The water is brought by piping from a nearby wind-pump. The trough is an 8′ galvanized iron one hung on pivots at each end and can quickly be tipped over for cleaning.

A bran bin reaching from the nail tie of the lower story to the nail tie of the upper story holds two tons and does not rob the sheep of any of the floor space. A paddock 40′ x 50′ at the west end, placed there after the photo was taken, gives ample room for exercise when the weather is good. The building is largely tenon and mortise, but the three inside bents are somewhat different. The long braces are about 25′ long, are spiked to the rafters above (see Fig. 171) and the posts below and rest on the foundation. They are also spiked to the girders and to the short braces, which are 2″ x 6″. This makes a strong brace and leaves unobstructed room for the hay fork.

The frame and joists are of oak; the rafters of sugar tree; the mow floor and nail ties of elm;

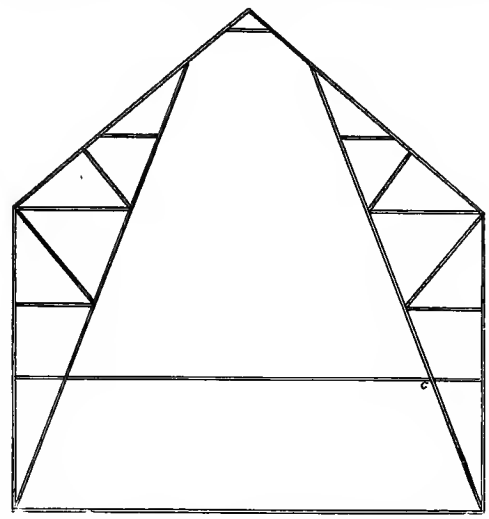


FIG. 171—A BABY MUTTON FACTORY (CONSTRUCTION).

the siding of pine ship-lap; the sheathing rough pine; the roofing, felt. The foundation is made by placing stone pillars under the posts and filling the space between with bowlders, gravel and cement. Therefore there are no cold draughts near the ground in rough weather. Two hay chutes drop the feed directly into the long rack. These and the stairway assist in making the ventilation perfect.

A UTAH SHEEP SHED.

Willard Hansen's Utah sheep barns or sheds (Fig. 173) are large enough to accommodate 500 ewes and lambs and 600 to 700 yearlings. In the breeding shed there are 10 large pens 32′ square, planned for the accommodation of 500 ewes. The division between the sections is a long feed rack. Each section may be divided into four smaller pens. A movable hurdle from the water trough to the door divides into two and by swinging the lamb-creep into place yet two other divisions are made. In the center of the pen facing south is a door 16′ wide and 4′ high;

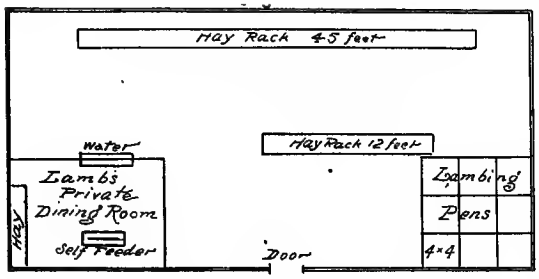


FIG. 172—A BABY MUTTON FACTORY (GROUND PLAN).

above this are two doors 8′ wide which swing in, and on either side of these two other doors which also swing in. The windows above the center doors may also be opened by swinging in from the bottom. This arrangement makes it very easy to turn this into an open or closed shed, as the weather may demand. The water trough is of galvanized iron and the amount of water is regulated by an automatic float. As will be noted the location of this water trough is such that the sheep in all four pens into which the larger pen may be divided have access to it. The doors in the passageway on the north are arranged to give greatest facility in changing sheep from pen to pen. In the lambing season Mr. Hansen keeps the ewes with twins and triplets in the smaller pens where he has opportunity to give them extra care if needed. Later these small pens with the lamb creeps in position are used to feed the lambs their grain and some choice hay for their especial benefit. At one end of the shed are the lambing pens; a section is provided with a stove where weak lambs may be cared for. At this end also is the granary. Above the sheep pens there is

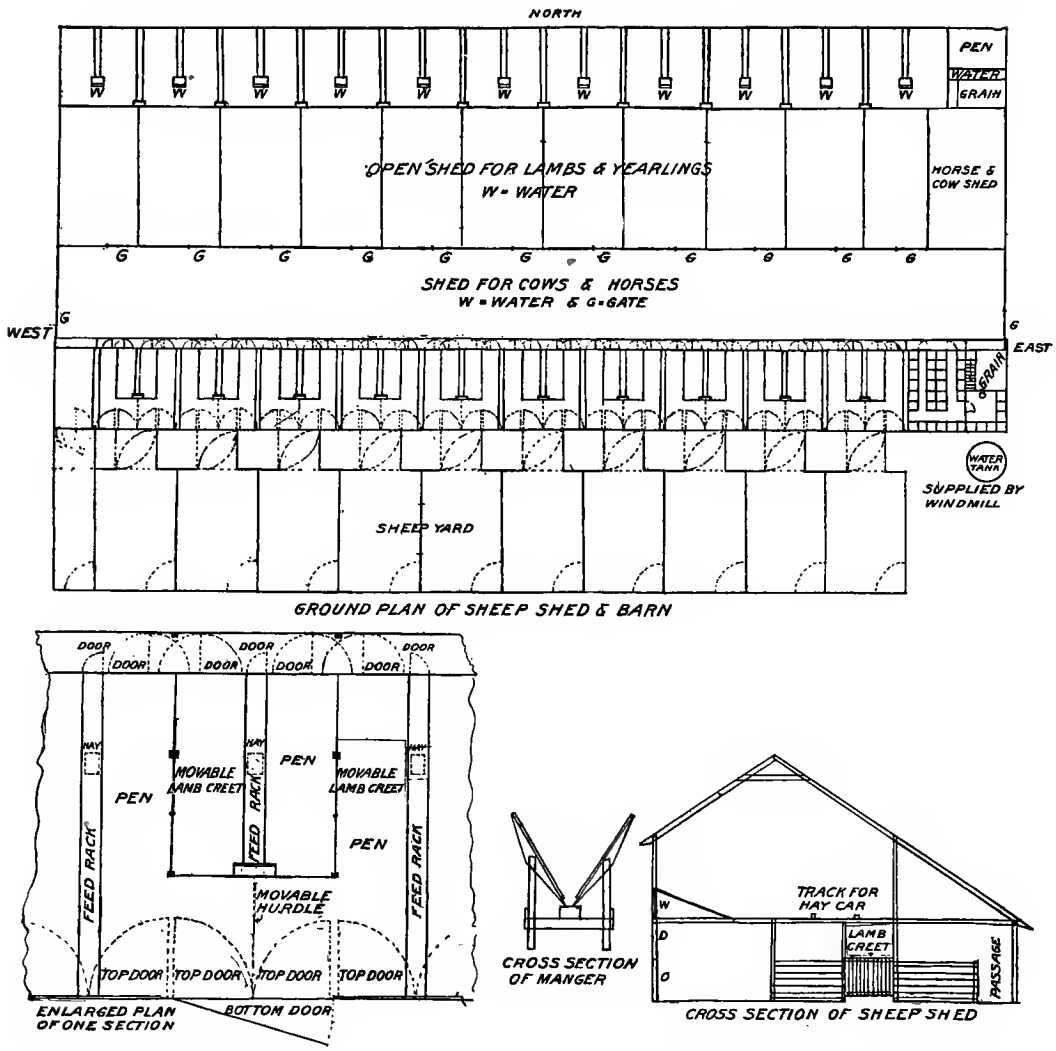


FIG. 173—A UTAH SHEEP BARN.

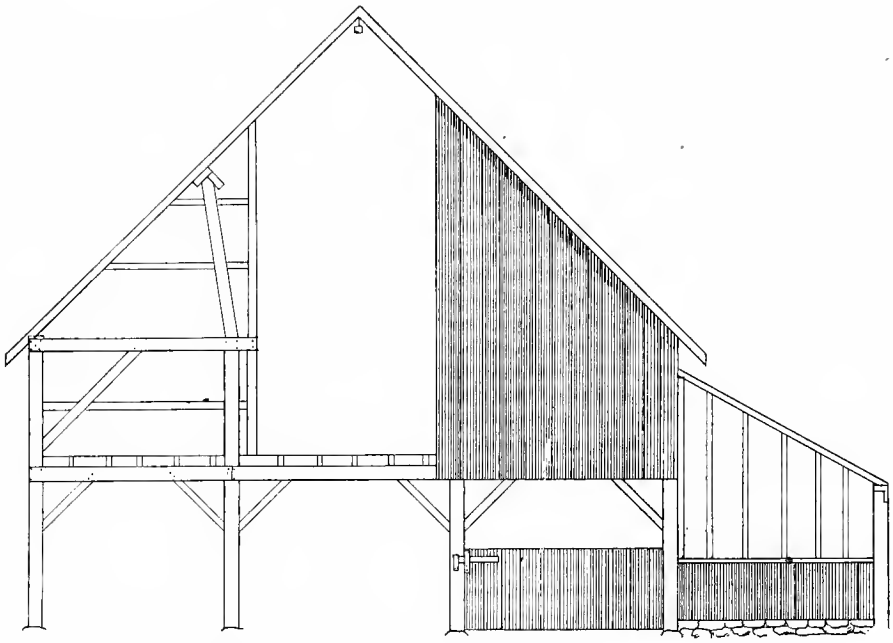


FIG. 174—SHEEP BARN WITH GLASS COVERED LAMB SHED (END ELEVATION).

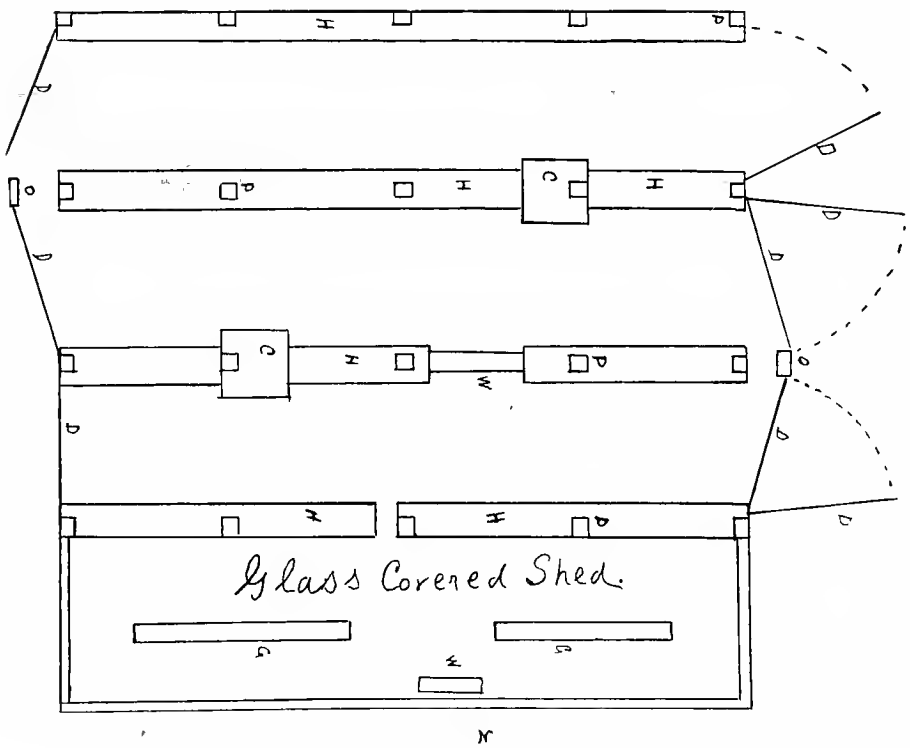


FIG. 175—SHEEP BARN WITH GLASS COVERED LAMB SHED (FLOOR PLAN).

storage room for about 100 tons of hay. The rest of the hay is stacked about 100′ west of the shed. In the winter the hay is loaded from the stack onto a wagon and with slings and a derrick from 1,000 to 1,500 pounds of hay is transferred at one lift to the car and from there through the hay chutes to the mangers below.

South of the sheds are the yards or runs. By the arrangement of the door and a gate, as shown, there is either a driveway 16′ wide along the whole front of the shed or an open passage for the sheep from the pen to the yard. The shed on the north is for feeding the lambs during their first winter. The arrangement is similar to the breeding shed, but this is open in front of each pen, no doors being provided. The hay is thrown in from the wagon on the north through doors at the end of each manger. The sheep can be divided as their feeding demands, 50 to 60 in a pen. The shepherd can pass from pen to pen through the boxes shown on the end of the long mangers.

SHEEP BARN WITH GLASS-COVERED LAMB SHED.

This sheep barn for 100 ewes is distinctly a sheep barn; there is no room in the basement for any other stock, while the floor above is all devoted to the storage of hay. Grain may be stored in moderate amounts in bins built above the racks at the side.

The plan (Figs. 174 and 175) shows a building 36′ square, with posts set 12′ apart. The shed at the side is also 12′ wide and 36′ long. It is built with a brick, stone or wooden wall 4′ high, all above being glass, set as green-house glass.

The barn should face east and west, so that the glass shed may be on the south side. At the end there are doors at each bent so that wagons may readily pass through to remove the manure. These doors are all in two parts, the upper part hinging at its upper edge and raising up as an awning rises, the lower half swinging as a gate swings. It will be noted in the floor plan that there are two posts, set opposite the door posts and 2′ away, against which the doors may be fastened if desired; this gives the sheep opportunity to pass around the end of the hay-racks, or when the doors are closed the barn is divided by the hay-racks into three long pens.

In explanation of the floor plan (Fig. 175) H shows hay-racks, which are also so constructed that grain is fed in them at will; PP are posts supporting the barn; C shows the chutes 4′ square down which hay is thrown; DD are doors; WW are water troughs; GG the troughs or self-feeders for lambs. The lambs gain access to this shed by means of a creep and have it to their sole use unless it is desirable to put a few old sheep there so that they will have a better chance.

The elevation (Fig. 174) shows a type of joist frame with open center and taking hay up from the outside. It is 16′ to the square, with half-pitch roof and holds ample forage for the 100 ewes and their lambs. For cheapness, convenience, good ventilation, comfort to the sheep and general all-around practicability this barn is admirable. With the upper doors raised and the wind circulating through, it is cool in summer; with the doors lowered it is a warm winter barn and with the ventilation that comes from the hay chutes there is never any danger of too much closeness in it.

INTERIOR ARRANGEMENT OF SHEEP BARN.

The sheep barn in which the arrangement of hay-racks is shown (Fig. 176) is 34′ x 50′. In Fig. 176 H stands between the posts dividing the barn into four compartments. Each rack is separate from the building and may be removed or turned around across the alleys if desired. At each end of alley is a door of full width to admit of a team passing through for convenience of cleaning out manure and also to allow of perfect ventilation. These doors should be in halves, divided horizontally, the lower half swinging, the upper half raising on hinges affixed to its upper edge. This confines the sheep while allowing free circulation of air.

The doors are hung by common strap hinges, 12″ or 16″ size, and are held open by two ⅜″ ropes fastened up about 10′ and with rings in them that catch in spikes driven in lower edge of doors. A good way is to use small wire rope, as the weather will not affect it. There may easily be devised other convenient devices for raising the doors.

C is the hay chute, and through it by means of a ladder the mow is reached. W is either a hay-rack or watering-trough, as thought best. If a trough it is not so wide. It may be supplied either by a hydrant or float-valve. It is better to have water in the yard on the south side of the barn, there being comparatively few days when it is so cold that the sheep would not prefer to drink there.

To give access to the various alleyways the arrangement shown at P and R is very satisfactory. It consists of an extra post in the ground about 2′ from the barn. To this post the doors latch when desired, allowing man or sheep to pass from one alley to the other. This is used during mild weather when the sheep are not desired separated into flocks. One such arrangement is to be put on the opposite side of the barn.

There may also be gates through the hay-racks but that is a waste of rack space. Hay is taken from either side of the chute, so that all racks are filled without traveling across the line of the

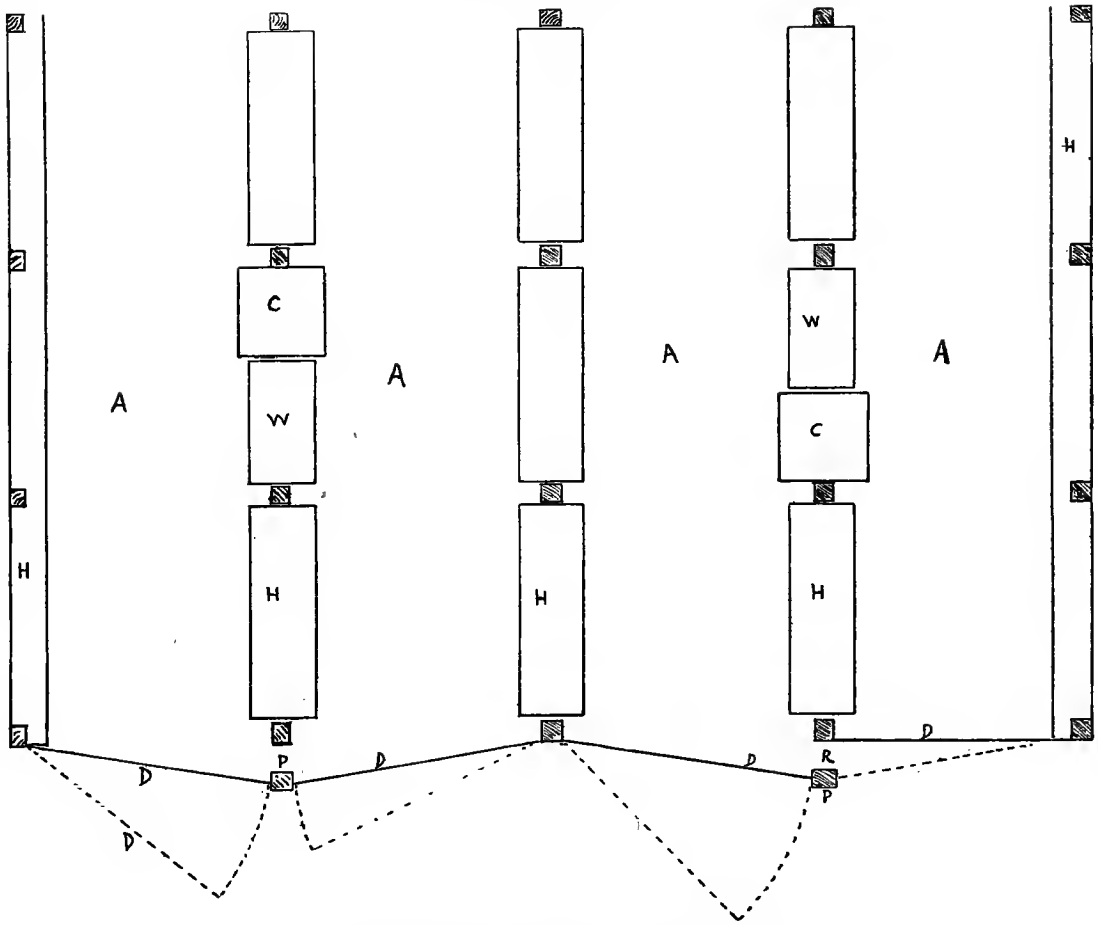


FIG. 176—INTERIOR ARRANGEMENT OF SHEEP BARN.

hay-racks. The arrangement of doors at P allows of the sheep being assorted while passing through, the operator standing at the door and by opening or closing it turning the sheep into yard or into adjacent alley.

Fig. 177 shows a cross section of one alley with section of the hay-racks adjusted to receive the hay. These racks are used for either hay or grain and when grain is to be put in the hinged sides are turned over, making a square box open at the top into which the ewes cannot see. The grain is then put in and all filled, the sides are turned back as shown and at once the ewes begin eating at nearly the same time. It may also be desirable to provide a few self-feeders for the ewes suckling their lambs. A, Fig. 177, represents a meal bin which may extend along a good part of each side. It is filled at D from outside (or inside if preferred) and the meal is drawn out at B. The meals should be mixed before being put into this bin.

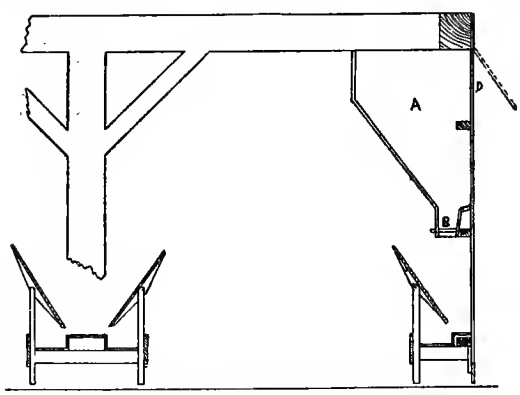


FIG. 177—INTERIOR ARRANGEMENT OF SHEEP BARN (CROSS SECTIONS).

SMALL SHEEP BARN.

The plan and elevation (Figs. 178 and 179) are of Joseph E. Wing's designing and of the barn he says: "For the average farm it is nearly an ideal sheep house. It may be built of any length and may inclose two or three sides of a yard. Being narrow it is readily ventilated and

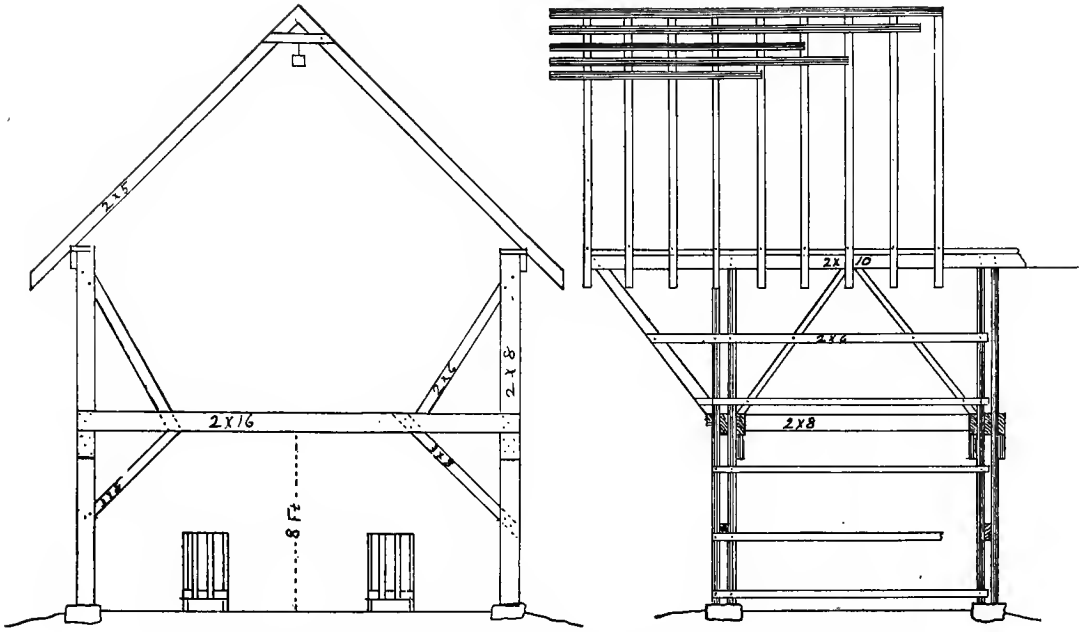


FIG. 178—SMALL SHEEP BARN (END AND SIDE CONSTRUCTION).

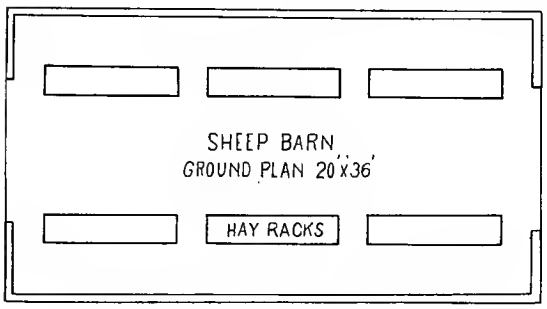


FIG. 179—SMALL SHEEP BARN (GROUND PLAN).

is easily divided to accommodate the breeding flock. There is no waste material in the frame and no encumbering posts. The height to plate is 16′, the width 20′; this width without central posts makes necessary the use of the 2″ x 16″ joist-bearers and the long supporting braces. Hay-racks are put in anywhere but should be of such length that two of them turned crossways will make a division in the room. The doors should permit driving through lengthways and crossways. The bents may be 12′ or 14′ apart, better 12′, so as not too heavily to burden the joist-bearers."

BARN FOR FEEDING SHEEP.

It was the idea of a feeder in Illinois to have a barn to hold 500 sheep with four pens of 125 each and an extra pen in which grain would be fed, all under cover. This building was designed for him and is made up of five squares each 40′ x 40′. (See Fig. 180.) The central square is for feeding and each flock takes its turn at the troughs. While the sheep eat grain, hay is placed in their quarters to which they return. The building is of joist construction with curb roof. The middle part contains large cribs and bins to

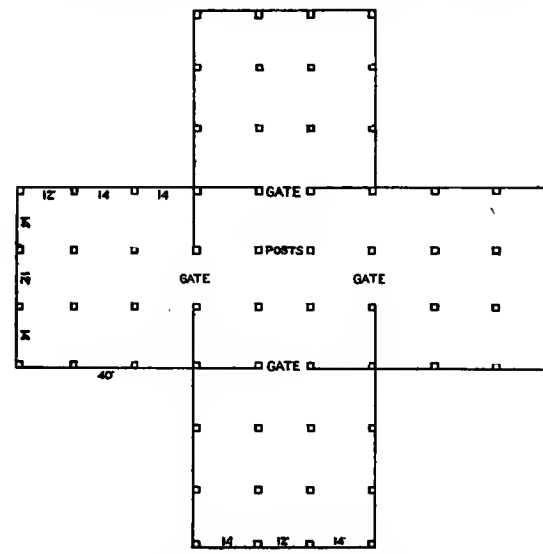


FIG. 180—BARN FOR FEEDING SHEEP.

which grain is elevated by horse-power. The upper story is lighted from the roof.

A SHEEP FEEDING SHED.

A cheap and practical shed for feeding about 400 lambs is thus described:

Fig. 182 shows an elevation of the frame. The

rear is 6′ high, the front 24′, and the width 40′. A portion of the higher part is floored to hold hay. All of two bents may be floored if desired. The frame should be of the simplest, either 6″ x 6″ posts with joist-construction plates and tier or all of joist construction. The plates should be 2″ x 10″; the roof should be of shingles, which should be nailed with either galvanized wire nails or cut nails. Common wire nails do not last well.

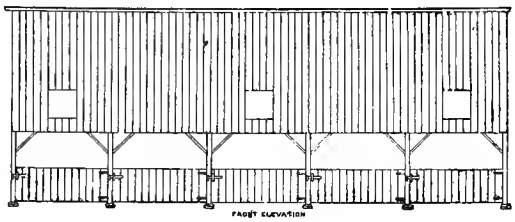


FIG. 181—A SHEEP FEEDING SHED.

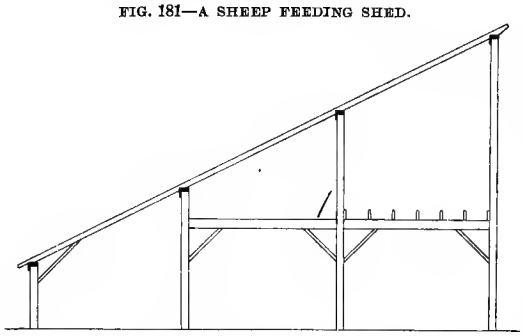


FIG. 182—A SHEEP FEEDING SHED (SIDE ELEVATION).

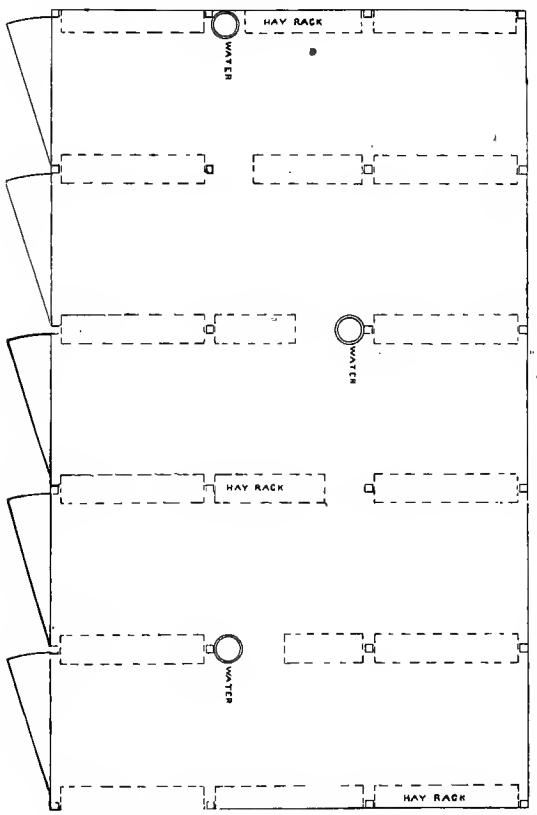


FIG. 183—A SHEEP FEEDING SHED (FLOOR PLAN).

Fig. 181 shows the front elevation of the shed. The doors turn to the south and each bent has its large half-door. It is not necessary to provide doors to the space above the half-doors. In feeding lambs these spaces would not need to be closed on the south side often enough in a season to make it worth providing them. If they are provided with doors they should be hinged at the upper edge so as to open upward.

The length of this building is 60′. The bents are spaced 12′ from center to center. Hay is put in through the upper windows. A track could be attached to the rafters and hay taken in by carrier at the end.

The floor-plan is shown in Fig. 183. The racks are not stationary. Doors are provided at the middle of each end, so that a team may pass through when cleaning out manure. The racks may be set aside from the middle bents during this process. Water will flow through all the troughs or be kept at a level by means of float-valves.

A LAMBING BARN FOR THE SOUTH.

The lambing barn illustrated in Figs. 184, 185 and 186 has a joist frame but has no interior posts, the width being but 20′ and the joist-

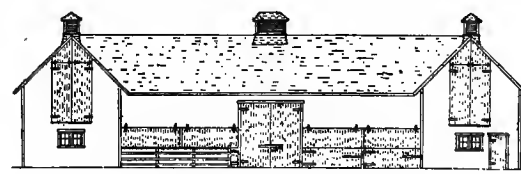


FIG. 184—A LAMBING BARN FOR THE SOUTH (FRONT ELEVATION).

bearers running crossways of the frame and made of three pieces of 2″ x 16″ stuff and further supported by braces above and below. The upper brace passes between two of these joist-bearers and also between the two pieces of 2″ x 8″ (see Fig. 185) that compose the posts which sustain a good deal of weight, leaving the joist-bearers only 10′ of unsupported span. The floor joists should be let in between these joist-bearers; that is, cut just long enough to slip down and spike fast at the ends, so there will be no waste of space as would be by putting them on top. There is no great weight to sustain.

The nail girts are simple 2″ x 4″ or 2″ x 6″ spiked on. A track runs the length of the barn under the peak. The building is three parts of a hollow square, enclosing a court open to the

sky 60′ x 80′ (Fig 186). In this will be a tank, preferably of cement, into which the roof water is led and maybe a spring made to pour through

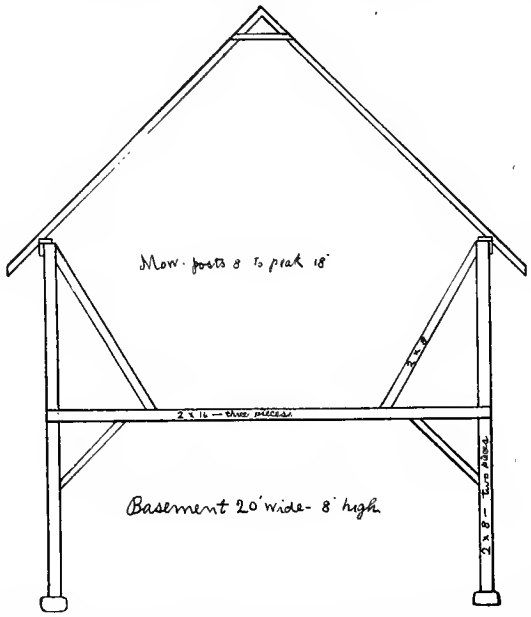


FIG. 185—A LAMBING BARN FOR THE SOUTH (CONSTRUCTION)

a pipe. Of course the open side is to the south. On two sides are many small 4′ x 4′ pens, in which ewes may be confined at lambing time;

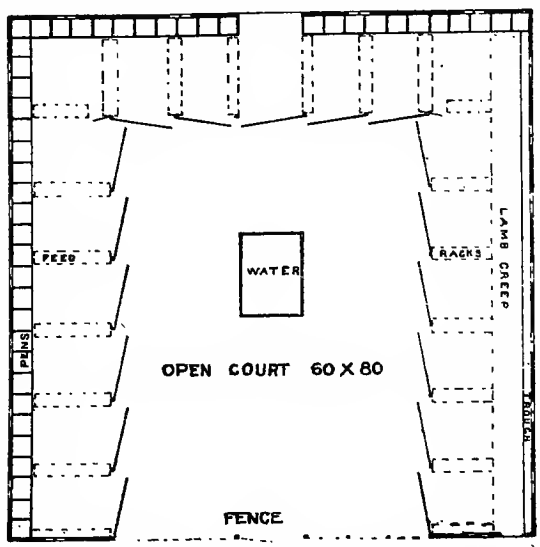


FIG. 186—A LAMBING BARN FOR THE SOUTH (GROUND PLAN).

these may be stationary or movable. Simple panels 4′ long, two hinged together and provided with hooks so as to be put together as nailed, is an admirable arrangement, as it gives all the space to the flock except when pens are needed. It will be noted that there are many pens divided off by the feed-racks, each opening by a wide door to the yard, so that one can separate the ewes according to his needs, or, turning the feed-racks about, throw two or all of them together.

On one side is the creep for the winter lambs. The doors are all on the court side and are double, one opening as common doors and gates do, the other swinging up as an awning swings, to let in a little air or a great deal of the sun, as desired. The court should be cemented or paved so there will never be mud, and the gate to the court should swing either way so sheep can never crowd it shut and injure themselves. There should be spouting along the court side of the building to carry away the drip. This building is nearly ideal for a Southern situation where the ewes get a considerable part of their feed in the fields yet require some forage, grain and shelter. It does not hold enough forage for a far Northern location but could be built wider and taller.

A LAMBING SHED.

While there is no doubt that lambs born in winter are generally worth more than those born later there is more or less risk in having them appear in the ordinary ewe sheds. Good management, therefore, dictates that there should be provided a small building apart from the regular sheep barn where the most forward ewes may be drafted and where they may go through the ordeal of delivery with more attention and greater quiet than can be had in the usual quarters. There are times too when artificial heat is essential.

The lambing-shed illustrated in Fig. 187 is light, warm, easily ventilated, the feed is above where enough hay is easily stored to carry the stock below through the season, the access is convenient and the manure easily removed. Furthermore, it is cheaply built. Reference to the floor plan shows the arrangement of the pens. The water is in half-barrels, all on the same level, connected by means of iron pipe that is buried in the ground and enters the tubs at the bottom. This arrangement insures against freezing and each tub will have in it the same amount of water. A float-valve in the supply pipe will regulate the water in each.

The gates to the pens are so arranged that when they open they hook across the passage, thus closing it and making it easy to direct sheep to any desired pen. The feed-racks are so arranged that lambs can not creep into or through them. At one end there is a room finished off nicely for the shepherd. The pen next to the shepherd's room is completely separated from the other pens by a tight partition reaching to the ceiling, the other pens being merely separated by the feed-racks. Between the closed pen and the

shepherd's room there is a sliding door next the stove. One side of the door is covered with zinc. There also is a sliding lath gate, so that by opening the door and closing the gate the heat from the stove will enter the pen. Entrance to this pen is also secured by opening the little gate by the stove.

Plenty of glass is provided so that the sun may come in, and at the rear of each pen is a door out of which the manure is thrown. Hay is pitched into the loft by hand through the front windows, it not being practicable to use machinery in so small a building.

As this building should be free from draughts it is well to build of good matched siding with paper under it or of rough siding and plaster outside the lower story. The windows must face the south or southeast and it may be built any desired length, although if intended to be very long part of it may well be turned in the form of an L. As fast as the lambs grow strong and able to endure the cold they are drafted out.

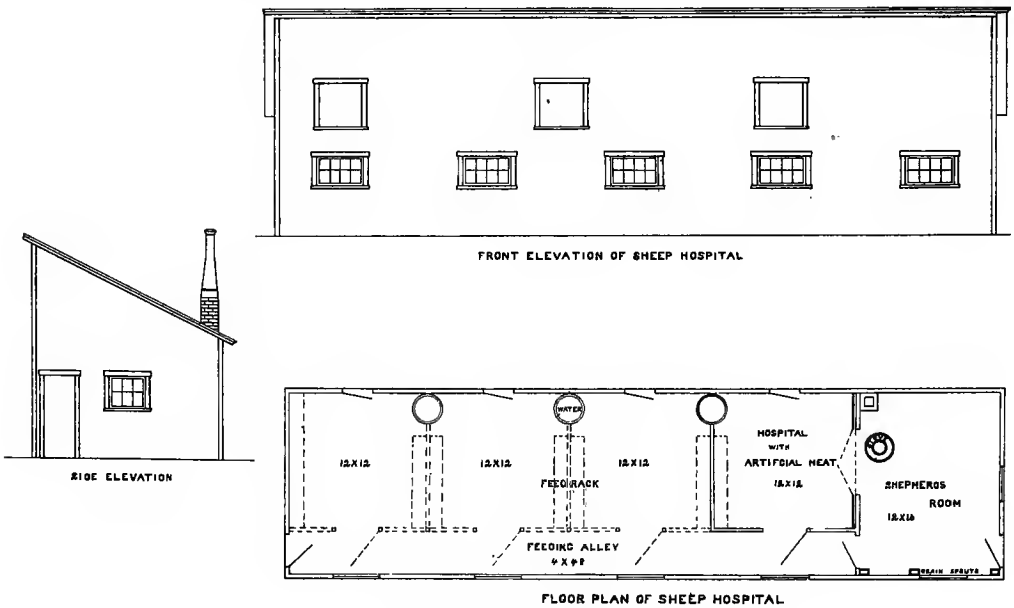


FIG. 187—A LAMBING SHED.

POULTRY HOUSES.

Too often, says Prof. G. C. Watson in Bulletin No. 41, United States Department of Agriculture, the location of the poultry house is thought to be of minor importance and consequently is given less consideration than any other farm building. Frequently the other buildings are located first and the poultry house then placed on the most convenient space, when it should have received consideration before the larger buildings were all located.

In caring for the various classes of live stock the question of labor is always an important item, and the class that requires the closest attention to petty details as a rule requires the greatest amount of labor. As poultry-keeping is wholly a business of details the economy of labor in performing the necessary work is of great importance. Buildings not conveniently located and arranged become expensive on account of unnecessary labor.

As it is necessary to visit poultry houses several times each day in the year convenience is of more importance than in case of almost any other farm building. The operations must be performed frequently, so that any little inconvenience in the arrangements of the buildings will cause not only extra expense in the care but in many cases a greater or less neglect of operations that ought to be performed carefully each day.

Poultry houses are likely to be more or less infested with rats and mice unless some means are provided to exclude them, and this should be taken into account in selecting a location. It is generally best to locate the poultry house at some distance from other farm buildings, especially if grain is kept in the latter. Convenience of access and freedom from vermin are two desirable points to be secured, and they depend largely on the location. Everything considered it is safest to have the house quite isolated.

A dry, porous soil is always to be preferred as a site for buildings and yards. Cleanliness and freedom from moisture must be secured if the greatest success is to be attained. Without doubt filth and moisture are the causes, either directly or indirectly, of the majority of poultry diseases, and form the stumbling block which brings discouragement and failure to many amateurs. It must not be inferred that poultry cannot be successfully reared and profitably kept on heavy soils, for abundant proof to the contrary is readily furnished by successful poultrymen who have to contend with this kind of land. The necessity for cleanliness, however, is not disputed by those who have had extended experience in caring for fowls, particularly the less hardy breeds. That an open, porous soil can be kept comparatively clean with much less labor than a clay soil will be evident to those who are at all acquainted with the habits of domesticated fowls. When the fowls are confined in buildings and yards that part of the yard nearest the buildings will become more or less filthy from the droppings and continual tramping to which it is subjected. A heavy or clayey soil not only retains all of the manure on the surface, but by retarding percolation at times of frequent showers aids materially in giving to the whole surface a complete coating of filth. If a knoll or ridge can be selected where natural drainage is perfect the ideal condition will be nearly approached. Where natural favorable conditions as to drainage do not exist thorough under drainage will go a long way toward making the necessary amends to insure success.

The material to be used in the construction and the manner of building will necessarily be governed largely by the climatic conditions. In general it may be said that the house should provide warm, dry, well lighted and well ventilated quarters for the fowls. In order to meet these requirements it will be necessary to provide a good roof with side walls more or less impervious to moisture and cold, suitable arrangements for lighting and ventilating and some means for excluding the moisture from beneath. Where permanent buildings are to be erected some provision should be made to exclude rats and mice, and for this reason if for no other the structure should be placed on cement walls with foundation below the frost line. Cheap, efficient walls may be made of small field stone in the following manner: Dig trenches for the walls below the frost line; drive two rows of stakes in the trenches, one row at each side of the trench and

board inside of the stakes. The boards simply hold the stones and cement in place until the cement hardens. Rough and uneven boards will answer every purpose except for the top ones, which should have the upper edge straight and be placed level to determine the top of the wall. Place two or three layers of stone in the bottom of the trench, put on cement mixed rather thin and pound down; repeat this operation until the desired height is obtained. The top of the wall can be smoothed off with a trowel or ditching spade and left until the cement becomes hard, when it will be ready for the building. The boards at the sides may be removed if desirable at any time after the cement becomes hard.

For the colder latitudes a house with hollow or double side walls is to be preferred on many accounts, although a solid wall may prove quite satisfactory, particularly if the building is in the

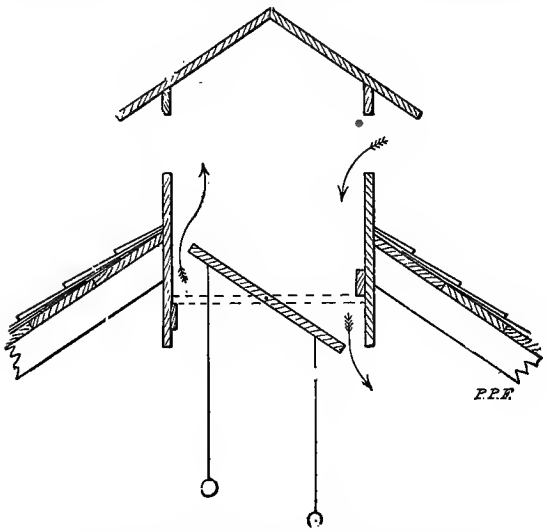


FIG. 188—SHOWING METHOD OF CONSTRUCTION.

hands of a skilled poultryman. Imperfect buildings and appliances when under the management of skilled and experienced men are not the hindrances that they would be to the amateur. Buildings with hollow side walls are warmer in winter and cooler in summer, with less frost in severe weather and less resulting moisture when the temperature moderates sufficiently to melt the frost from the walls and roof of the house.

A cheap efficient house may be made of two thicknesses of rough inch lumber for the side and end walls. This siding should be put on vertically, with good quality of tarred building paper between. In constructing a building of this kind it is usually best to nail on the inner layer of boards first, then put on the outside of this layer the building paper in such a manner that the whole surface is covered. Where the edges of the paper meet a liberal lap should be given, the object being to prevent as far as possible draughts of air in severe weather. Nail the second thickness of boards on the building paper so as to break joints in the two boardings. In selecting lumber for siding it is best to choose boards of a uniform width to facilitate the breaking of joints.

In constructing a roof for a house in the colder latitudes one of two courses must be pursued: either to ceil the inside with some material to exclude draughts or to place the roof boards close together and cover thoroughly with tarred paper before shingling. The ordinary shingle roof is too open for windy weather when the mercury is at or below the zero mark. The fowls will endure severe weather without suffering from

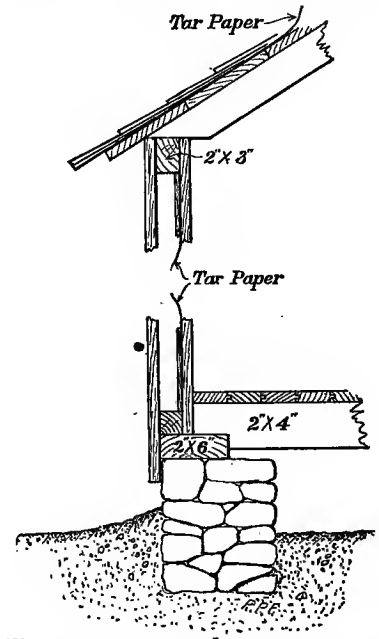


FIG. 189—SHOWING HOLLOW WALLS AND FOUNDATION.

frosted combs or wattles if there are no draughts of air. Hens will lay well during the winter months if the houses are warm enough so that the single-comb varieties do not suffer from frost bite. Whenever the combs or wattles are frozen the loss in decreased egg production cannot be other than serious.

Figs. 188 and 189 represent a cheap and efficient method of building a poultry-house with a hollow side wall. The sill may be a 2″ x 6″ or 2″ x 8″ scantling, laid flat on the wall or foundation; a 2″ x 2″ strip is nailed at the outer edge to give the size of the space between the boards which constitute the side walls. A 2″ x 3″ scantling set edgewise forms the plate and to this the boards may be of rough lumber if economy

in building is desired. If so the inner boarding should be nailed on first and covered with tarred building paper on the side that will come within the hollow wall when the building is completed. This building paper is to be held in place with laths or strips of thin boards. If only small nails or tacks are used the paper will tear around the nail heads when damp and will not stay in place.

The cracks between the boards of the outside boarding may be covered with inexpensive battens if they are nailed at frequent intervals with small nails. Ordinary building laths will answer this purpose admirably and will last many years, although they are not so durable as heavier and more expensive strips. The tarred paper on the inside boarding and the battens on the outside make two walls, each impervious to wind, with an air-space between them.

In preparing plans for a building one of the first questions to be decided is the size and form of the house. If the buildings are made with the corners right angles there is no form so economical as a square building. This form will inclose more square feet of floor space for a given amount of lumber than any other, but for some reasons a square building is not so well adapted for fowls as one that is much longer than wide. It is essential to have the different pens or divisions in the house so arranged that each one will receive as much sunlight as possible, and to secure this some sacrifice in economy of building must be made.

Many poultrymen prefer a building one story high and not less than 10 nor more than 14′ wide and as long as circumstances require. In most cases a building 30′ to 60′ long meets all requirements. If this does not give room enough it is better to construct other buildings than extend one building more than 60′. It must be remembered that each pen in the building should have a separate yard or run and that a pen should not be made to accommodate more than 50 fowls, or better 30 to 40.

The building should extend nearly east and west in order that as much sunshine as possible may be admitted through windows on the south side. The windows should not be large nor more than one to every 8′ or 10′ in length for a house 12′ wide, and about 17″ from the floor, or at such height that as much sunshine as possible will be thrown on the floor. The size and form of the windows will determine quite largely their location. In all poultry houses in cold latitudes the windows should be placed in such position that they will give the most sunlight on the floor during the severe winter months. One of the common mistakes is in putting in too many windows. While a building that admits plenty of sunlight in winter time is desirable a cold one is equally undesirable and windows are a source of radiation at night unless shutters or curtains are provided. Sliding windows are preferred on many accounts. They can be partially opened for ventilation on warm days. The base or rail on which the window slides should be made of several pieces fastened an inch or so apart, through which openings the dirt that is sure to accumulate in poultry houses may drop and insure free movement of the window.

Some means of ventilating the building should be provided. A ventilator that can be opened and closed at the will of the attendant will give good results if given proper attention, and without attention no ventilator will give best results. All ventilators that are in continuous operation either give too much ventilation at night or too little during the warm parts of the day. Ventilators are not needed in severe cold weather, but during the first warm days of early spring and whenever the temperature rises above the freezing point during the winter months some ventilation should be provided. Houses with single walls will become quite frosty on the inside during severe weather, which will cause considerable dampness whenever the temperature rises sufficiently to thaw out all the frost of the side walls and roof. At this time a ventilator is most needed.

A ventilator in the highest part of the roof that can be closed tightly by means of cords or chains answers the purpose admirably and may be constructed with little expense. The ease and convenience of operation are important points and should not be neglected when the building is being constructed. It is a simple matter for the attendant to open or close a ventilator as he passes through the house if the appliances for operating it are within easy reach. Fig. 188 represents an efficient and easily operated ventilator.

Perches should not be more than 2½′ from the floor and should be all of the same height. Many fowls prefer to perch as far above the ground as possible in order without doubt to be more secure from their natural enemies; but when fowls are protected artificially from skunks, minks and foxes, a low perch is just as safe and a great deal better for the heavy-bodied fowls. It must be borne in mind that the distance given at which perches should be placed from the floor applies to all breeds of fowls. It is true that some of the Mediterranean fowls would not in any way be injured in flying to and from the perches, but some of the heavy breeds would find it almost impossible to reach high perches and would sustain positive injuries in alighting on the floor from any considerable elevation. Convenient walks or ladders can be constructed which will

enable the large fowls to approach the perches without great effort, but there are always times when even the most clumsy fowls will attempt to fly from the perch to the floor and come down with a heavy thud, which is often injurious. And furthermore ladders or stairs for the easy ascent of fowls are more or less of a nuisance in the poultry house. The ideal interior arrangement of the house is to have everything that is needed in as simple a form as possible and not to complicate the arrangement by any unnecessary apparatus. The fewer and simpler the interior arrangements the easier the house can be kept clean and the greater the floor space available for the fowls.

There is no reason why all the perches should not be placed near the floor. Movable perches are to be preferred. A 2″ x 3″ scantling set edgewise with the upper corners rounded answers every purpose and makes a satisfactory perch. The perches should be firm and should not tip or rock. The form of the scantling makes it easy to secure them firmly and still have them removable.

Underneath the perches should always be placed a smooth platform to catch the droppings. This is necessary for two reasons: the droppings are valuable for fertilizing purposes and ought not to be mixed with the litter on the floor; then too if the droppings are kept separate and in a convenient place to remove it is much easier to keep the house clean than when they are allowed to become more or less scattered by the tramping and scratching of fowls. The distance of the platform from the perch will be governed somewhat by the means employed for removing the droppings. If a broad iron shovel with a tolerably straight handle is used the space between the platform and perches need not be more than 6″. The droppings should be removed every day.

A CONVENIENT POULTRY HOUSE.

Fig. 190 shows a very handy poultry house that is 28′ long and 20′ wide with hall 4′ wide running lengthways through the center. The house is divided into eight rooms, four on each side of the aisle, leaving a space 7′ x 8′ for each room. The 6″ x 6″ sills can be used laid on stone or blocks set in the ground. Use 4″ x 4″s for up-and-down studding spiked 2½′ apart on top of the sills. Use 2″x6″s for floor joists 20′ long, spiked to up-and-down posts. Floor with common inch-flooring or cement. The center posts, 4″ x 4″s, are spiked on top of sills 4′ apart each way, leaving a 4′ aisle through the center of house. The plates on top of the posts and the rafters are 2″ x 4″s. Drop siding is best for the studding.

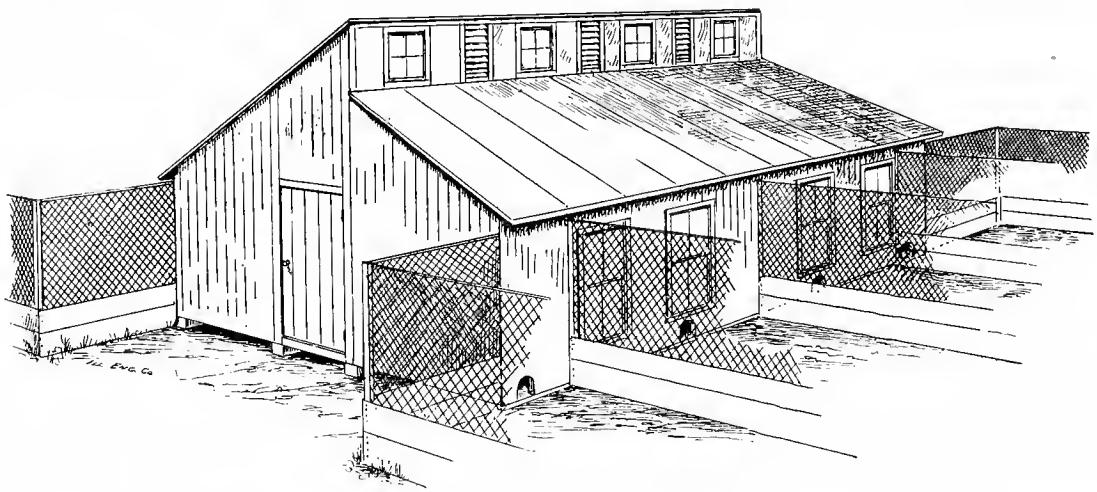


FIG. 190—A CONVENIENT POULTRY HOUSE.

The roof is sheeted and shingled. The inside of the house should be plastered with cement plaster. When plastered it is easy to exterminate lice or mites and the plastering can be easily whitewashed and swept off clean.

The partitions and inside doors should all be wire poultry-netting fastened on strong frames so that all can be removed when the breeding season is over and the whole house be used in one or two parts one on each side. Roosts to perch on are not generally used in this house where the large breeds are kept. The floor covered with straw three or four inches thick makes a good roost for large breeds. It is claimed they will do better and never have bumble foot. The straw should be swept out once a week and fresh straw supplied.

The windows may be of any suitable size. The upper windows are half as large as the lower ones.

No more windows should be used than the diagram shows, as too much glass light is said to be injurious to poultry.

The yards outside should be 10′ wide and at least 100′ long. To get four yards 10′ on each side of the house the corner pens must be brought out 6′ on each corner of house. This leaves 4′ of the house for each of the outside pens. These pens should also be bedded with straw or litter of some kind from three to five inches deep and all grain fed should be strewn in this to make the hens work most of their time.

A SUMMER HEN HOUSE.

A practice in some communities is to close up the winter quarters of fowls and compel them to seek shelter elsewhere during the hot summer weather, the object being to rid the house of vermin, avoid further care of the fowls and give the poultry a cooler roosting place. Those who thus close the hen houses up and turn the poultry out make the mistake of not providing other quarters. The poultry will to some extent take to the trees and this will teach the young fowls to roost there, which not only exposes them to danger during the night but renders it difficult to accustom them to going into a house when fall approaches.

A poultry house is illustrated in Fig. 191 that has the advantage of being quickly and easily constructed adjacent to the regular house or apart from it and will serve the purpose of a protection to the fowls during the night almost as effectually as though they were shut in winter quarters under lock and key, provided always that the lock is also applied to the latter.

Its general plan of construction is shown quite plainly in the halftone. It has a shed roof and stands with an end to the other poultry house. The back and the other end are sided with rough lumber. The front is left almost entirely open save for the covering of poultry netting, which serves the purpose of a front and yet is perfectly open to the air. There is also a door by which the structure may be entered independently of the regular house. The summer house should include an exit other than the regular door for the poultry. After such a house has served its purpose for a summer shelter it still has a further usefulness during the winter as a combination scratching shed and sunning place for the poultry. If this is in view the shed should be closely attached to the regular poultry house. Whether the house is to be used for summer or for both summer and winter it should have a water-tight roof.

FIG. 191—A SUMMER HEN HOUSE.

A FARM HEN HOUSE.

A cheap and convenient poultry house that can be built by any farmer is illustrated in Fig.

192. The building is 10′ x 24′ and should stand facing the south. The sides and ends can be made of rough boards and the cracks battened with laths or strips inside and out, or matched boards can be used and lined inside with building paper. It can be made any height desired and the roof can be made of shingles or matched and grooved boards well painted. Fig. 192 gives an end view of the inside. A partition should extend the full length 4′ from the north side. This will make an entry (A) 6′ x 24′ and a room (B) 4′ x 24′, which can be made in two pens 6′ x 12′ if desired. C is a movable floor with two roosting poles attached. D is nest boxes, extending into the entry, with lids so eggs can be gathered without going inside the pen. E is a cleated board leading to the nests. The space F is made of slats so fowls can reach through to the drinking trough G. H is a sliding door for the ingress and egress of fowls which can be opened and closed from entry by means of a cord. I J is a door leading from the entry to the pen.

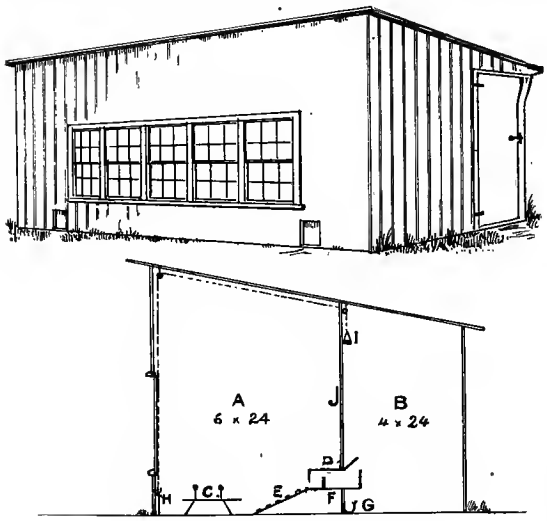


FIG. 192—A FARM HEN HOUSE.

AN ILLINOIS POULTRY HOUSE.

The poultry house shown in Fig. 193 is 7′ x 16′ and 7′ high at the front side and 4′ at the back, with a shed roof. It may be built of 2″ x 4″s for frame, covered with common rough or dressed boards and battened on the outside with planed or rough battens. Shingles are better for roof than tarred paper, which does not make a durable roof. To make it warm the house should be lined inside with tarred paper and should have at least two 9″ x 13″ six-light windows in the south side near the center of the building. A half-dozen flat stones may be used for a foundation just set even with the surface so as to allow the sills to clear the ground. Gravel or cinders to the depth of 6″ may be used for floor. All surface water in winter and early spring should be kept out. The gravel or cinders may be covered with sand so as to make a smooth surface.

The roosts should be built on the north side of inch boards cut into 4″ strips and should have the edges made rounding and set flat side down in notches cut in brackets extending from the back side of the coop. The perches are 2½′ above the floor and under them is suspended a platform to receive the droppings, which can be easily removed every morning or twice a week. The floor can be kept clean by using a common garden rake and raking up all the droppings that may be scattered during the day. The material for the house shown in Fig. 193 costs exclusive of floor and paint about $12.

To build the yards connected with the house

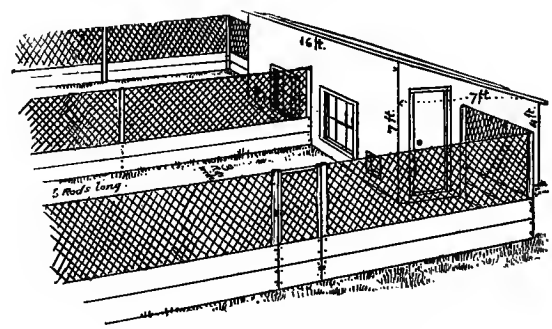


FIG 193—AN ILLINOIS POULTRY HOUSE.

set posts 12′ apart and board up 2′ from the ground with common rough 12″ boards; then above that use 2″ mesh poultry netting 36″ wide. This makes a fence 5′ high and no fowl except some of the small breeds will ever fly over it. The boards at the bottom are to keep cocks from fighting through the fence. If desired this house can be used for breeding fowls to accommodate two yards of 12 fowls each by running a partition through the center and having each yard connect with one end of the house. The yards should be three rods wide and six rods long, north and south, with the north end connecting with the house. If a large number of fowls is to be kept a number of these houses can be built in a row, all facing the south, far enough apart to admit of the runs or yards being built three rods wide. In this case a tight fence can be built between the houses on the north side to keep the cold wind from the fowls.

DESIGN FOR A POULTRY HOUSE.

The poultry house shown in Fig. 194 has some good points about it not generally used. It accommodates 100 hens and is 20′ long, 12′ wide

and 12′ high at the back side. It has a dirt-proof roosting floor running from the top of the back side to near the bottom of the front. This floor is made of cheap flooring boards and lacks 2′ of being the full length of the building. This space allows one to pass from the house proper to the perches, which are placed along on the upper side of this slanting floor far enough apart to be perfectly clear of each other, the droppings rolling down in front of and outside the building. Underneath the bottom of this floor is made a run extending half-way across the width of the building. The top of the run is intended for nests. At the bottom of the back are two rows of secret nests. Make a number of windows in the south and at least two in the back. The perches should not come nearer than 6″ of the slanting floor and should be easily removed for cleansing and whitewashing as often as desired. All nests should be movable, one at a time if wanted. An earthen or cement floor may be used. At the

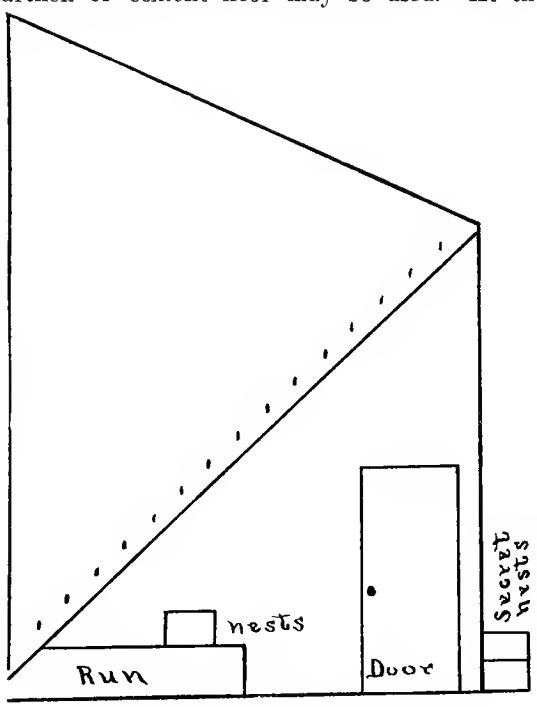


FIG. 194—DESIGN FOR A POULTRY HOUSE.

bottom of the perches lay a flat board on which to walk.

The secret nests open on the inside but are built on the outside. Chickens enter at the door and a small open window which is made above the slanting floor at the back end. The opening at the bottom of the slanting floor is about 6″ in the clear. The building faces south and has the door or entry way in the east. The double row of secret nests is to the right. Another row of nests is made to the left. These nests are built upon the run, which is open only under the south side of the building. The upper half of the south side is made chiefly of glass.

A GOOD TYPE OF HEN HOUSE.

One of the essential characteristics of a model poultry house is that it shall not be too expensive to be within the reach of the average farmer. Another essential is that it be warm and another

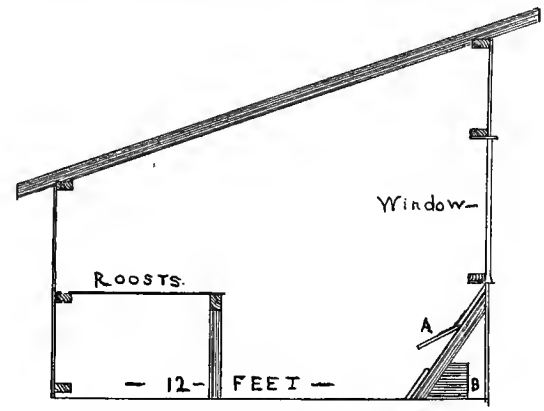


FIG. 195—A GOOD TYPE OF HEN HOUSE.

that it be well lighted. The illustration (Fig. 195) very nearly explains itself. The front of the house should face the south. It is 10′ high in front and 6′ in the rear. With a width of 12′ the house may be built of 16′ boards without waste. No frame is needed except the horizontal girts. Braces should be cut and nailed diagonally to stiffen the building. Put several windows in the front to let in sunlight in winter. All roosts should be on the same level or there will be endless rivalry for high perches. Along the front put the nests. A is a hinged board that may be lifted to gather the eggs. B is the alleyway through which the hens pass to their nests.

The house may be built 12′ x 20′ for 100 hens. Put in a cement floor.

HOUSE FOR 150 HENS.

The house shown in Fig. 196 for 150 hens may be divided into five departments. A good width is 15′. Make a scratching room where the exercise will be had and the food given in deep, dry litter 15′ square. Next this is a roosting department 5′ x 15′. Then make another roosting-room for the second pen, then another scratching room and so on the length of the house, which in this plan is 15′ x 100′. Let the roof slope from front to rear, the house 5′ high at the rear and 8′ in front with glass at the scratching rooms to cover at least a fourth of the space. Let the sun in. Have the glass in front of the scratching sheds

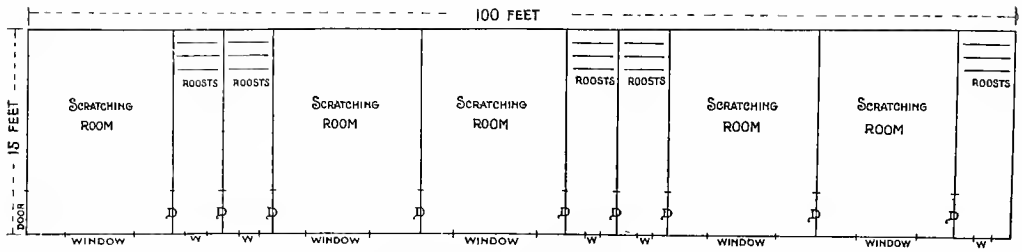


FIG. 196—HOUSE FOR 150 HENS.

so that the windows may open on hinges and the fowls be restrained by wire.

Take the foul air out by means of galvanized iron pipes (with dampers) 6″ in diameter running up through the roof and opening near the ground to admit the colder and fouler air from near the floor. Let the roosts be easily removable and all on the same level. Turn the glass side toward the sun. Make the house tight and warm by double boarding and tarred paper. Put in a cement floor. The partitions may be made of wire. The doors should swing on double-acting spring hinges so that one may go rapidly through them in either direction.

POULTRY HOUSE FOR 250 HENS.

A roosting house to accommodate 250 hens at night and with some 50 nests may be built 12′ wide and 40′ long with six roosts through it,

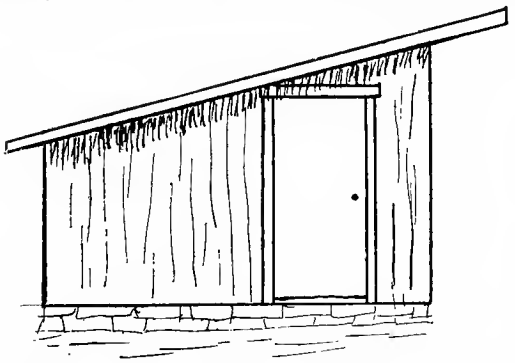


FIG. 197—POULTRY HOUSE FOR 250 HENS (END ELEVATION).

which will give 240′ of roosting space. (See Figs. 197, 198 and 199.) The roosts will be

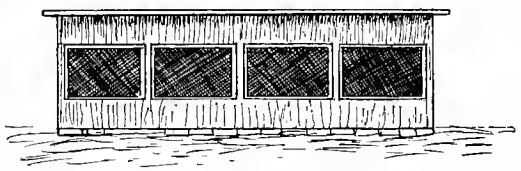


FIG. 198—POULTRY HOUSE FOR 250 HENS (FRONT ELEVATION).

square 2″ x 2″ sticks, not fastened down, laid on trestles 2′ high. The whole thing is easily taken out to be cleaned and disinfected. There ought to be some galvanized pipe ventilators going out through the roof, taking their air from near the floor. Make the sides tight and warm with tarred building paper. Turn the front to the south. Make the back wall 5′ high, the front wall 8′ or

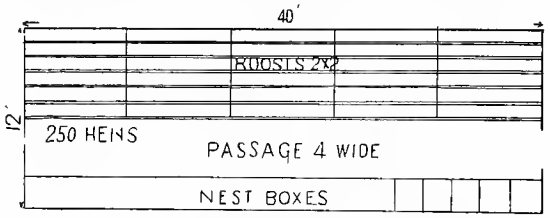


FIG. 199—POULTRY HOUSE FOR 250 HENS (GROUND PLAN).

9′, use 16′ rafters, provide a great deal of wire-netting covered window in the front, which should also have tight-closing wooden doors that may be opened in mild or summer weather and closed in cold weather.

A SIMPLE AND PRACTICAL HEN HOUSE.

The poultry house shown in Fig. 200 has a shed roof and faces the south. This house may be 10′ wide and as long as desired to accommo-

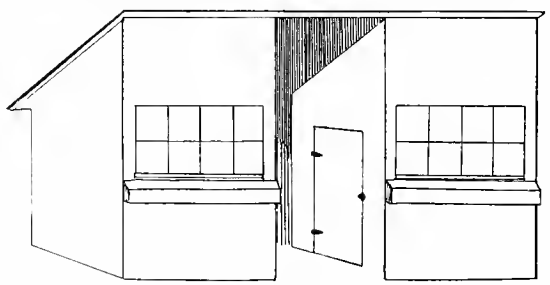


FIG. 200—SIMPLE AND PRACTICAL HEN HOUSE.

date the number of chickens kept. The scratching shed is in the center of the building and communicates with each room by means of doors, which may be locked at night, thus allowing the chickens to be confined at night.

The roof projects over the south, east and west sides 1′ and is raised 5″ higher than the siding, allowing free ventilation. Two very large windows admit light and warmth. Extending the

entire length of each room is a laying-box, divided into compartments and covered with a hinged lid, allowing the eggs to be gathered by simply raising the lid and passing along on the outside. Two rooms, built in this way, are much better than one, because very often one class of fowls should be separate from the rest. The floor should be tight and be cleaned weekly. The inner side of walls should be whitewashed frequently, as the lime will cause vermin to seek other quarters.

FARM POULTRY HOUSE.

This building (Fig. 201) will accommodate from 50 to 75 fowls. Face it to the south to

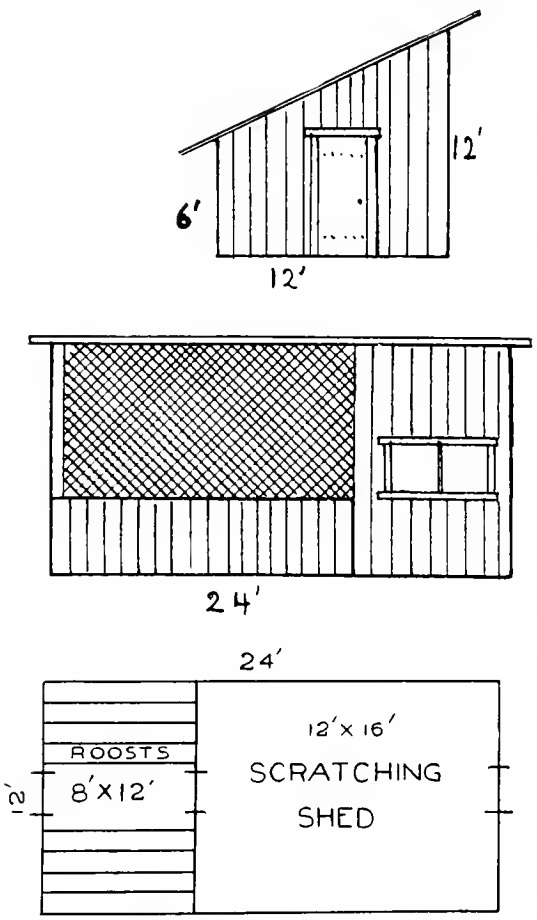


FIG. 201—FARM POULTRY HOUSE.

admit the sun; make the sleeping quarters warm; provide an open wire-enclosed front for the scratching shed when built in the Corn-belt or further south; make the floors of earth and keep them well littered; make the roosts movable and not to touch the walls. Farm poultry should not be confined except occasionally; the scratching

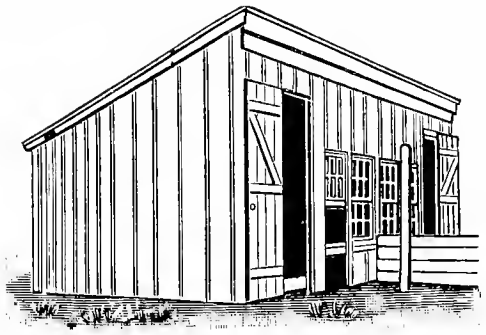


FIG. 202.

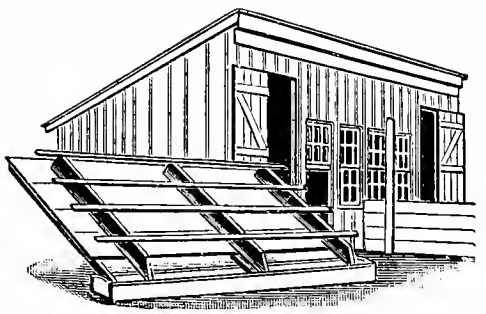


FIG. 203.

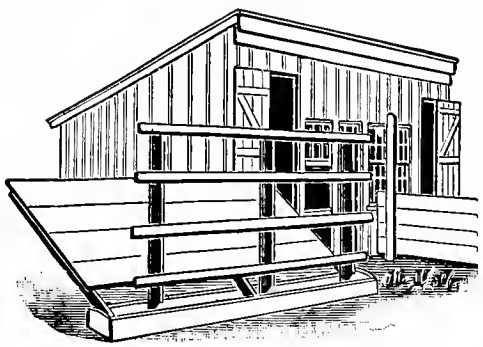


FIG. 204.

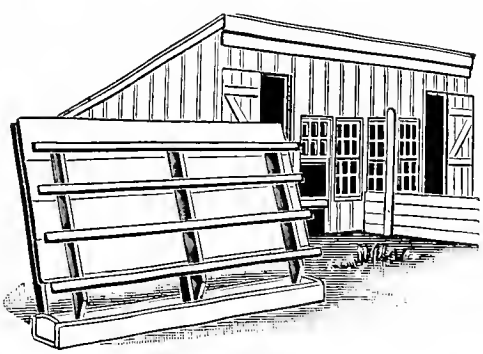


FIG. 205.

shed affords opportunity for occasional confinement.

CONVENIENT SMALL HEN HOUSE.

Fig. 202 represents the south side and west end of a hen house 10′ wide and 20′ long, divided into two rooms by a partition of wire netting. This building serves two yards, as the middle fence between the two yards joins up to the center of the building at the front and back.

Fig. 203 represents the platform and perches removed from the house to the outside, in order to get a good view of it. It stands on the outside in the same position as if in use on the inside.

Fig. 204 represents the perches as raised up against the wall in cleaning, to a perpendicular position.

Fig. 205 represents the perches and platform raised to a perpendicular position for the purpose of cleaning out the trough.

MISCELLANEOUS.

SILOS.

LOCATION OF A SILO.

When possible the silo should be located in the feeding barn, since it not only brings the cost of building within the reach of every one who is really in need of a silo, but greatly facilitates the handling of the silage when feeding it out. Depth in a silo is always preferable to breadth, so that in the case of basement barns it is advisable to let the silo reach from the top of barn posts to the ground floor of the basement; a door or opening can then be made from the silo directly into the basement where the silage is to be fed. The next best location is adjoining the feeding stable. In most dairy stables the cows are stanchioned in two long rows facing each other and whenever it is possible it should be arranged so that the silo can be entered from the end of this feeding alley. A wooden track can be laid along the center of the feed-way and into the silo, upon which a low-wheeled car can be operated to distribute the feed. If the silo building is located entirely separate it should be planned to load the silage into a cart, which can be driven into the feeding barn, thus delivering the silage with little labor directly to the stock. The idea of convenience should not be lost sight of, for by exercising a little thought and judgment the labor of waiting on the stock through the long feeding season can be greatly reduced.

FILLING SILOS.

The cost of putting corn into the silo depends largely on the advantage taken of all the little devices that are calculated to lighten and reduce the labor of harvesting and drawing to the silo. By the use of the corn binder for cutting in the field and conveniently equipped wagons for hauling there will be no more hard work connected with securing the fodder for filling the silo than there would be in harvesting a clover or grass crop. Many farms are supplied with low-wheeled wagons or trucks. A very simple and practical way of equiping the ordinary high-wheeled farm wagon is shown in Fig. 206. This rack is made of 2″ x 8″ plank, 16′ long, one end of each being placed on top of the forward bolster; the other ends pass under the rear axle and are chained or bolted up tight to it; these two pieces make the foundation of the rack. The wagon is coupled out as far as these planks will allow. On top of the plank are placed four cross-pieces, equally distant from each other, as shown in the figure. These cross-pieces are 2″ x 4″ and should be about 7′ long; upon these are laid inch boards parallel with the wagon. The load is of course placed wholly in front of the rear wheels, but the rack is sufficiently large and low enough to enable a man to put on a ton of green corn from the ground without having to climb up on the load or hand it to a second person to deposit.

While it is true that silage cut fine may pack somewhat closer than that cut long, it is doubtful whether there is any material gain in the operation; by cutting fine more of the inner parts of the stalks are exposed to the air, and perhaps more fermentation induced than with longer cuts. There is nothing gained by cutting fodder

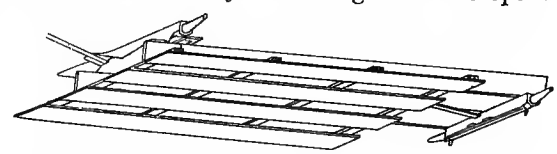


FIG. 206—RACK FOR DRAWING FODDER CORN.

fine instead of coarse, provided stock eats it equally well in both cases; the gain in cutting, which is often very great, comes mainly from getting consumed that which would otherwise be wasted. In the case of silage, there being no necessity for cutting the fodder in order to have it eaten, the length of the cut appears to turn upon somewhat closer packing on the one side and extra expense of fine cutting on the other. With ample power and a modern feed-cutter a silo can be filled in about half the time taken by the old methods.

When corn has reached the proper stage of maturity it is not necessary that it be wilted before putting into the silo in order to make the so-called sweet silage; only the immature fodder needs wilting; such should be wilted from twenty-four to forty-eight hours, if possible, before cutting into the silo. Varieties that mature, if left until the ears begin to glaze, can be put into the silo immediately after being cut with satisfactory results, provided there is no outside moisture on the corn as it goes into the silo; nor is it necessary to suspend operations every other day in order to let the silage in the silo reach a certain temperature before filling can be continued. If the corn is sufficiently mature, and is put into the silo without rain or dew, there need be no fears about the quality of the silage, whether put in slowly or rapidly. There is a limit to putting dry or excessively wilted corn into the silo beyond which we dare not go. When the corn has lost enough water to cause the leaves to rustle and break in handling it does not pack closely enough in the silo to exclude the air, and on opening the pit it will be found that the silage is fire-fanged and permeated all through with a white mould. There is another reason why the corn should not be allowed to become so dry even if there were no trouble about its keeping in the silo: when dry corn is put into the silo we have lost the succulent quality of the silage that makes it especially desirable. Having once commenced to fill the silo the work can be crowded right along by observing the conditions mentioned. In case of an accident or break-down it will do no harm to suspend work for a day or two, but if left longer than this the silage to a depth of two or three inches usually begins to mould. When filling is completed a foot and one-half of chaffed straw, marsh hay or cornstalks will make a sufficient covering. The use of weights is now obsolete. The silo should be examined daily for a couple of weeks and the covering pressed down until the settling has ceased.

The question is often asked if one crop can be placed on top of another in the silo, provided that the first has only partially filled it. Most certainly; if one crop, as clover, for example, only partly fills the silo, when the corn crop has matured the covering of the clover can be removed or left on, as desired, and the other crop placed on top of it. By filling at different times much more can be got into the silo than if a single crop is placed therein by rapid filling. Even with the slow filling silage settles considerably after the silo is closed up; with very rapid filling it may settle as much as two-fifths or even one-half. Under any system it is well to allow two or three days' settling at the last and filling up again so as to get in all the feed possible.

CONSTRUCTION AND TYPE OF ILLINOIS SILO.

The well-known Illinois dairyman, H. B. Gurler, thus describes several types of silos and their construction: My first silo was built over twenty years ago. It was rectangular in form, 20′ deep and sheeted inside the studding with a single sheeting of first-class matched ⅞″ pine. A few years later I built another silo with three compartments and double-sheeted the inside walls, using paper between the two courses of lumber. In about seven years these double walls began to show decay and at the end of ten years I was compelled to tear them out and put round silos in their place. A double wooden wall is the last kind of a silo I would build if I were to build another, as the moisture gets between the two layers of wood and does not dry, causing decay, and the walls are decayed beyond usefulness in a few years. If one will persist in using wood let it be of but one thickness and of a quality that will be sound and make as near an air-tight wall as possible.

Five years ago I built my first round cemented silos, building three that season. The following year I built one 38′ in diameter, which I consider too large, as I am compelled to feed about 200 head of cattle when it is opened to keep ahead of decay. If I am feeding less than that number there is danger of the silage being exposed so long that decay will begin and then trouble begins, especially if it is being fed to cows that are milking. Twenty feet in diameter is a convenient size and I would not build with my present knowledge any larger in diameter, but build as deep as I could conveniently in our prairie country. (See Fig. 207.) Three of mine are 38′ deep and three are 24′ deep. I prefer the deeper ones. With five years' experience I am confident that the round cemented silo is the most economical kind to build that I know anything about. The cement preserves the silage and also preserves the wood, as it prevents moisture from reaching the wood from the silage. In case the cement cracks (I have had very little

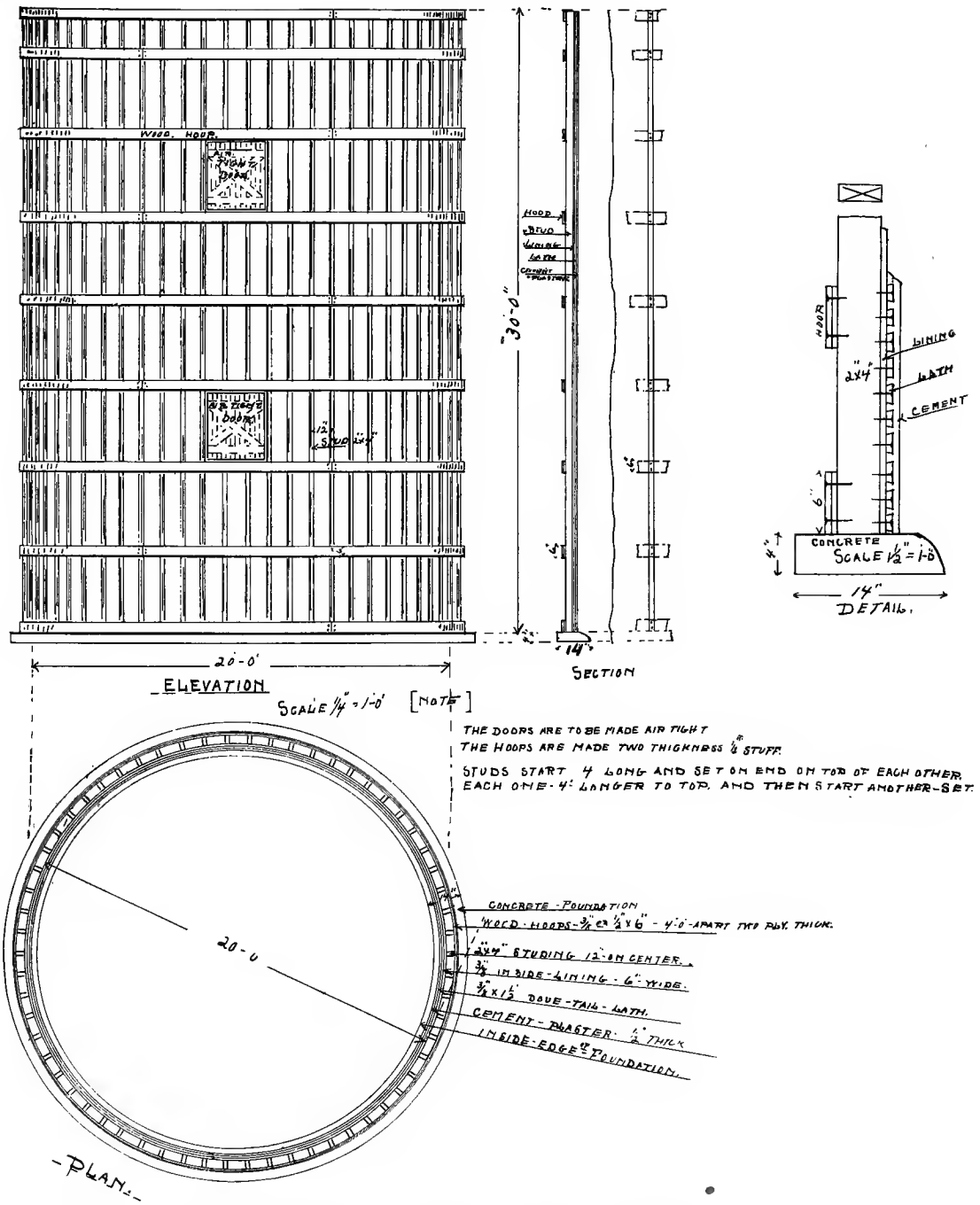


FIG. 207—CONSTRUCTION AND TYPE OF ILLINOIS SILO.

trouble in that way) go over it with a wash of cement the same as a cistern is repaired when it cracks. I find this to fill all cracks perfectly, so that one would not know that there had ever been cracks. A cemented silo cannot be built as cheaply as a wood one if the first cost alone is considered, but if the matter of durability is taken into consideration I fully believe they are the most economical to build. I believe my cemented silos can be kept in perfect condition for 50 years at the simple expense of once in about three years giving them a coating of cement wash. This we do as we fill them, applying as high as we can reach from the ground and when

we have them filled nearly to this point put the wash on to another section and so on to the top.

The silo that I built in 1898 on which I put no roof cost me 12½ cents per square foot of surface wall. To illustrate: A silo 20′ in diameter is 63′ in circumference and if 38′ deep or high it has 2,400 surface feet, which at 12½ cents per foot would cost $300, and it would hold 250 tons. Some would figure it to hold 300 tons. This does not include the cost of a roof, which after three years' experience I am confident is more a matter of convenience than of necessity. I do not believe it adds a dollar to the value of the contents of the silo. I do know that the roof is very much in the way when we reach the top in filling, as a man six feet tall is constantly bumping his head against the roof.

My silos all have clay floors and the silage keeps as well on clay as on cement. If you need to keep the rats out cement the bottom. The foundation may be of stone, brick or cement (grout) to a proper distance above ground. I used 2″ x 4″ studding, 12 in centers, but I am certain that they might have been put 15 to 16 in centers just as well, as all the object of the studding is to hold the lumber together, as there no lateral pressure can reach the studding unless the lumber sheeting is first pulled in two by the pressure, and the pressure required to break this circular sheeting is something surprising. The inside sheeting was secured by taking 6″ fencing and having it resawed, making the material a little less than ½″ thick. On this were put laths made from the same material, the laths being made with beveled edges so that when nailed onto the sheeting horizontally the same as the sheeting is put on we have a dovetailed joint between the laths to receive the cement, preventing its loosening until it is broken. The patent grooved laths might be used, but they cannot be sprung to a 20′ circle.

The first three circular silos that I built were put in a row and inclosed with a frame building like a barn. This obviated the need of sheeting outside the studding. Not being certain that I had sufficient resistance to the lateral pressure in the inside sheeting, laths and cement, I put wooden hoops outside the studding, using the same material that I did for the inside sheeting, putting it on double and breaking joints. I learned that I could secure more resistance for the money in wood than I could in any form of iron hoops and where protected from the weather they were all right. For outside sheeting I used in one case the same material that was used for sheeting inside. This acts as weather-boarding and also helps to resist the lateral pressure. For the cement work use none but the best (I used the Portland) and mixed it one part cement and two parts clean sand. Be careful not to have any clay or loam in it.

A SILO OF WOOD, CEMENT, PLASTER AND SHINGLES.

According to Joseph E. Wing this is the cheapest and perhaps the most economical silo yet devised. He thus explains the method of construction:

Begin by digging a trench as narrow as you can with your post hole diggers and 3′ deep, widening it at the bottom. This trench will be circular, of the diameter you wish your silo, 12′, 14′ or 16′. I would not build wider than 16′ with this form of construction. Fill the trench with good cement concrete, ramming it hard, and extend it up above ground 2′. It should be made 8″ thick above ground. To build this make a form of thin boards bent in a circle like a cheese box. Make the top of the concrete exactly level. Procure common rough barn siding or fencing; for a silo of small diameter 6″ fencing will be good; for a wide silo the stuff may be wider. Make two hoops of boards ½″ x 6″, 5″ larger than the inside circle of the concrete foundation. Treble the ½″ boards, breaking joints. Lay these hoops on the wall and take a piece of siding, set it up inside the circle and nail fast, seeing that it is vertical. Set up four of these boards about the wall, then plumb them carefully and brace them, raising up the other circle and nail it at the top. If you wish to go higher let the upper hoop extend above the top of the boards 3″. It will then serve to catch the lower ends of the second set of boards. Now nail on all the boards, siding as though siding a barn. Nail barrel staves lightly at the middle to hold in place. Leave an open strip 3′ wide where the doors will come. You now have a big barrel made of 1″ boards and nothing whatever yet to give strength or tightness.

The bottom of the lower door should be 7′ up from the ground; side up to that point. At the side of the doors, on the inside, nail 2″ x 6″ studding, flat-ways, directly to the boards to strengthen them there and make a finish. Provide stuff ½″ or ¾″ thick 3″ wide and begin to put it on horizontally around the outside of silo, spacing 3″ apart. Nail it well and break joints. On this shingle the wall. Let the stuff go across the doors and be especially careful to select good material there and to place it judiciously. Doors need not be closer than 4′ to each other. It is easy to lift silage 2′ and then to dig down 2′ to a lower door. It will add to strength to make them 6′ between.

If one length of the boards can not be obtained set up another set on top of the first. It is just as well to do this in any case. A silo should be

at least 30′ deep. You may use 16′ stuff for bottom set and 14′ for the top. That with the wall gives a 32′ silo. Run a few strips of strap iron up the siding to hold the two sections together in a cyclone. When all is stripped with the ½″ x 3″ stuff you have a wall that can not be rent asunder. The tensile strength of wood is enormous. Cheap elm or green oak will bend easily and make good material for this stripping.

Lath the inside with common plastering laths but space them 1″ apart. Nail a row of them right around, then another row right on top of the first, breaking joints and allowing the second lath to project above the under one ¼″. thus giving a secure hold for the plaster. These plastering laths alone would hold the silo from spreading. Plaster with best Portland cement into which sufficient fibrous gypsum has been mixed to make it adhesive. Now and then whitewash it with pure cement after being used or coat it with pitch to preserve it from the acid of the silage in that when it settles will leave the silo ful of the silage will be good. Bevel the 2″ x 6″s that form the door jambs to receive the doors.

This silo has had tests in Michigan and elsewhere and has enthusiastic adherents. It should endure for many years and has the advantage of the stave silo in that it will never blow down nor collapse. In roofing it at the top bend around and nail five thicknesses of the ½″ stuff to make a plate. Get 2″ x 12″ plank long enough for rafters and rip them diagonally from corner to corner. This should be done in a mill, where it is done very rapidly. Set them up with points together and toe-nail together, then shingle. This makes a sightly conical roof. Make it steep; it looks better and enables you to blow a mound of silage. Leave the earthen floor and every spoon-nearly full.

THE WING CEMENT SILO.

This silo built by Joseph E. Wing has a wall 6″ thick at the base thinning to 4″ at top. It is 16′ in diameter and 30′ high. (See Fig. 208.)

Mr. Wing thus tells how it is built: We bought a quantity of 2″ x 7″ hemlock staves to form the inner core of the form. In erecting this core we nail a ½″ strip 6″ wide horizontally about the staves on the inside as we set them up; this keeps them in place and is easily torn off when taking down the wood. The staves we beveled slightly as silo staves are beveled. I think now that to have grooved them and put in the grooves short metal tongues at three or four points along the length so that they would have been unable to move against each other would have been wise; they could have been set up more rapidly. We set them up much as you would set up any wooden silo, a 16′ length first, using a wooden hoop 2″ x 6″ built of ½″ stuff as a form to build against, this hoop being on the inside of the silo. Each stave was spiked to this hoop; when the lower section was finished the spikes were withdrawn and the hoop raised up for the second form.

The outer wall of the form was of ½″ oak stuff, 8″ wide, the boards running about the silo horizontally and held in place by 2″ x 4″ studding set about 2″ apart. To hold these studding at the right distance from the inner core they were wired in three places with No. 12 wire,

FIG. 208—THE WING CEMENT SILO.

boring through the staves of the inner form for this and passing the wires through these holes and fastening by letting the loop pass about a big nail. The wires we learned should be twisted to get the slack all out of them. They pass through the wall and are left in.

In beginning we dug a circular trench 2′ deep, widening it at the bottom to give a good bearing and filling it first. The concrete was raised by means of a pole derrick, which should be about 6′ higher than the silo is designed. This derrick is easily revolved and is guyed in four or six directions with long and heavy guy wires. Scaffolding is carried up as you go. Concrete mortar is lifted up by horse power, swung in place rapidly and deposited in the forms with shovels. After one knows how, silos may be very rapidly built in this manner. Our men were all our

regular farm laborers. We think this silo will be a permanent thing.

The thinness of the walls forbids putting much if any dependence in their strength to resist bursting. The bursting pressure of silage at 30′ depth is 330 pounds per square foot, according to King. If your silo is 16′ in diameter it must therefore have strength to resist 2,640 pounds pressure for each foot in height. As you go up the pressure decreases, of course. Concrete should have a tensile strength of about 200 to 500 pounds per square inch. We imbed wires or rods directly in the mortar to hold the strain. Iron hoops designed to hold wooden silos may be put in. Wire is rather cheaper and more easily handled. Get No. 00 wire. It is hard to handle, so reel it out across the field and rig a lever of a 6″ sapling about 20′ long and put a team on it across a stump and stretch it till it lies straight. Then cut it into lengths long enough to reach around the silo and 6′ longer. At each board lay in a wire or two before you put in cement, wrap the ends about each other and turn them back; the cement will not let them slip when it is hard. These encircling wires should be in the middle of the thickness of the wall, so insert upright wires in the wall about 3′ apart; they will also prevent cracks and will hold the horizontal wires in place. No. 00 wire has a tensile strength of about 7,000 pounds. If the silo is to be 30′ deep begin by putting one at the ground level, then up 8″ put in another and at each 8″ board. This is a little stronger than is absolutely needed, but I do like a thing to be safe and wire is not very costly. It will not rust in the cement. At the doors, which need not be closer to each other than 6′ and should not be nearer the ground than 7′, place upright rods 1″ in diameter on each side and loop the wires about them. Across the bottom and top of the doors pass similar iron 5′ long with ends turned up 2″ and curving as the curve of the wall.

We mixed our concrete at a strength of one barrel of cement to a yard of gravel. It seems to be very hard. We washed the wall with a brush with a wash of nearly pure cement, water and a little sand. We put a roof on, as the silo may hold silage until summer time some years, and roofs are not very costly. The floor is of clay, which it seems is better than anything else. It is not excavated at all. The pole may be sawed in sections and thrown out of the window or left in the silo until it is fed out and sawed off then.

If you are building of a different dimension remember the rule for calculating the pressure on your walls is to assume the normal pressure at a depth of 30′ to be 330 pounds per square foot and to multiply this by one-half the diameter of your silo wall. Be sure you put in enough and put no dependence in the cement for resisting bursting strain. The thin wall is very much cheaper than the thick one and just as good, if the steel is there.

The oak stuff that makes the outside of the form warps and cannot readily be used again for silo building, though it is useful in a hundred other ways; the inner shell is practically uninjured by the use made of it.

All concrete work should be moderately wet down, never made sloppy, and rammed hard in the mould until moisture rises on top. If it is made very wet it is nearly ruined. It should not be wet until just as it is ready to use.

I think a 4″ wall is right and just as good as one 18″ thick, barring possible freezing. I insist that abundant steel must be used and advise coating the inside with hot pitch to make it acid and air-proof.

It is not necessary to use a complete form for the entire silo. We set up first a 16′ length of inner staves, afterward another 16′ length on these, thus needing as much timber for this inner form as is needed to build a complete wooden silo. We now think this a mistake. These staves can as well be in 8′ lengths and after two sets are up the lower set is as well taken away and moved up, next the second set moved up, thus proceeding until the silo is tall enough. These staves should be all accurately fitted together before work is begun. There should be three dowels or pins in each stave and holes exactly corresponding on the other side. These dowels should be made of ¼″ steel. They should fit tightly on the one side and the holes to engage them should be large enough to allow them to enter and remove easily. Thus equipped the staves are very rapidly set up, as each one supports the one next to it, and the dowels prevent them crowding in when the concrete is tamped behind them. A set of these staves will last for many years. The first year's use of this silo disclosed less than 10 pounds of spoiled silage.

A SILO OF CONCRETE BLOCKS.

A silo built of concrete blocks has been designed by Joseph E. Wing. He says the blocks are easy to make and will lay without mortar under them or at the ends and make an air-tight and water-tight job. There will be no need for a skilled mason in laying them. They are made just right in length and curve to make the wall, and where windows come they can be sawed in two or shorter ones made to fit the openings. Joints are broken just as in any stone work and the effect is pleasing.

The block is made in a wooden mould and after being set the mould is taken off and the block hardened before being used, as any artificial stone

blocks are made. It consists of two pieces, each 2″ thick, 8″ high and of convenient length, say 3′. These pieces are curved to fit the desired diameter of the silo and are spaced 2″ from each other. They are held together by square loops of steel wire, large size, such as No. 4. This wire is bent in a form into the desired shape and two pieces are put in each block. Being very large stiff wire the blocks keep their position exactly when made even, though they do not at any part touch each other. This forms a stone block 6″ wide (it may be made 8″ if desired) and with a hollow clear through its length of 2″. These blocks may also be easily made in two parts; in one part is moulded two bolts 6″ from each end; they are bolts ¼″ x 7″. In the inner block, the mate, two holes corresponding with these bolts would be moulded with a ¼″ depression in the inner surface of the block. After they were hard the two parts would be fitted together, nuts put

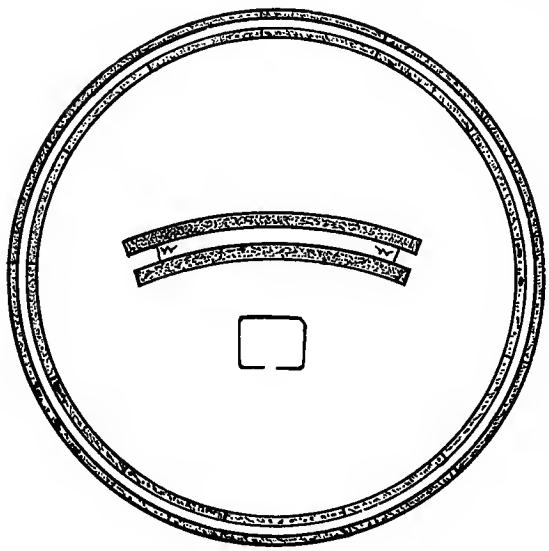


FIG. 209—A SILO OF CONCRETE BLOCKS (CROSS SECTION).

on, the depression making the nut flush with the inside of the wall, then the double block laid in the wall and the channel filled as described. Afterward the projecting bolt ends would be smoothly clipped off. The bolts would not show on the outside at all. This block would present no difficulties in manufacture whatever and when once completed the two original blocks and the core would be inseparably united. The foundation is made below ground in a narrow trench in which ordinary concrete is rammed. Level it and lay the first course of hollow blocks. Fill the channel with rather thin concrete, lay in a No. 4 wire to hold the wall from spreading and lay the next course, breaking the joints carefully. Again fill the channel with cement, lay down another wire and another layer of blocks and so on up to the windows. At the windows (and the lower one should be up 7′ and the next one up 6′ higher) one can fit in a good wooden frame against which to build and there should be iron rods run up vertically through the channel to make it extra solid there, while the wires will loop about these rods and their tops and bottoms be fastened together, so that there will be no danger of the silo bursting at this point. There should be abundant steel put into this wall, so that all bursting strains would be resisted by the concrete. Reference to the diagram (Fig. 209) will make plain the idea. The section of silo shows a course of blocks laid with the continuous channel open and ready to be filled with cement. It is actually a form of concrete and is left there when filled instead of being taken away as a wooden form would be. The block construction is clearly shown and the bit of heavy wire bent into shape to be inserted in the form and built into the block to hold the parallel sides in place. This idea, by the way, is applicable to straight walls for houses or any kind of buildings.

The wood mould is made with a curve to fit the silo and of any convenient length, as 3′, and as wide as the wall is thick, say 6″. A depth of 8″ will lay very well. Clamps hold the bottom of the mould to the ends and sides. A curved wooden block 2″ thick fills the central portion of the mould to make the hollow in the stone and this block must be made a trifle tapering to be readily taken out and in three parts divided vertically, so that the cross wires will not hold it. These cross wires are held in place by the central block and cement poured in and gently rammed about them.

In making these cement stones gravel is not used but coarse sand instead. In erecting a silo after this manner only scaffolding timber would be needed and the scaffold would be inside the silo, though hoisting would be by pole and derrick, as in any silo, the arm simply swinging material over the wall to the scaffold.

Silage has a bursting-pressure at a depth of 30′ of 330 pounds per square foot. At 20′ depth the pressure is 220 pounds. To calculate the bursting-pressure per vertical foot in a round silo multiply the pressure per square foot by half the diameter of the silo. Thus in a 16′ silo 30′ deep the bursting-stress at the bottom is 8 x 330 =2,640 pounds for the vertical foot, decreasing as you get higher.

A STONE SILO.

The silo shown in Fig. 210 has a capacity of about 650 tons. Its walls are 2′ thick and are lined with cement. It is of a somewhat different

type from most silos, being wider and not so high. This silo is built cylindrically and largely of stone. Where they are lined with cement one

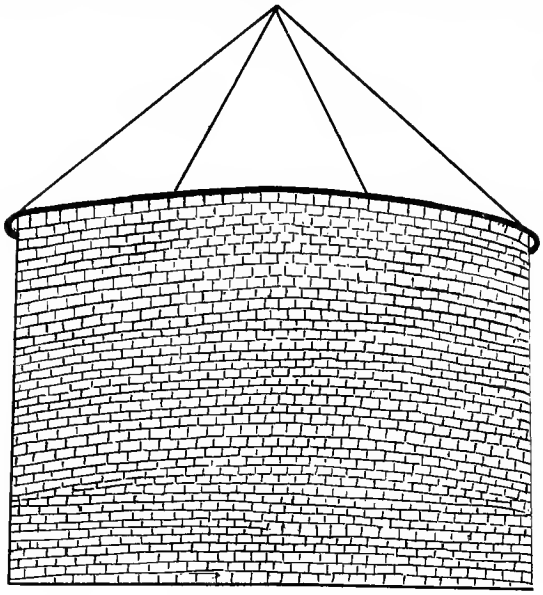


FIG. 210—STONE SILO.

seldom if ever has moldy silage around the edges. Silos built like this one are expensive of course to build, but are economical in the long run.

CRIBS, GRANARIES AND WORK SHOPS.

Perhaps the cheapest building for a crib or granary is square, of capacity enough for the grain produce on the farm. But as corn is stored when not entirely dry it can be cured better in narrow cribs. On this theory are designed two cribs set parallel under one roof and 12′ apart. (Fig. 212.) This gives a driveway of sufficient size to store reaper, mower and all implements of the farm if necessary to store them here. If this driveway should be used for implement room care should be taken not to let any of the tools or implements come near enough to the sides of the crib to give rats a chance to gnaw their way in.

The cribs are each 6′ x 36′ at the bottom and 8′ x 36′ at the top. The object of this is to give the sides of the cribs an outward slope, which serves two or three valuable purposes. First, it prevents rats climbing up the sides; second, it prevents rain driving into corn and third, makes it easier scooping corn from wagon. Rats will climb up the perpendicular sides of a crib to an open window or even to the top of the crib. To prevent their going over top of crib place a board extending 6″ over the edge of the ties and plate to which the slats are nailed. The windows must not be left open after the corn is put in.

The bottom of each crib is 6″ x 36′ and rests on stone foundation 3′ in ground. (Fig. 211.) The sills are 8′ x 10″ by 36′, and the joists are

FIG. 211—CORN CRIB (FOUNDATION PLAN).

2″ x 10″ by 6′. The sills rest on the stone piers 18″ thick 1½′ above ground. This gives thorough ventilation.

There are three windows on each side of driveway for receiving corn when the cribs are filled. These windows are 4′ x 4′ and are fastened by a strong wooden button. After the crib is filled to middle of these windows the corn is thrown over the top. With top of crib 8′ x 36′ there can be stored after the crib proper is full to the square one-third more corn.

The framework consists of three bents 12′ each. The space over the driveway out 12′ at each end is floored over and gives room for several hundred bushels of corn or 1,000 bushels of wheat. This crib and granary are absolutely rat-proof if the doors and windows are not left open longer than when used to put in or take out corn, and if one is careful not to set boards or tools against the cribs for resting places for rats to gnaw their way in.

The slats on the outside and inside of the cribs are oak, 3″ x 1¼″ and ½″ apart. Care should be taken not to use any slats with sappy or wavy edges.

It will be noticed that the size of the ties may seem heavy, but the fact is they are not too heavy,

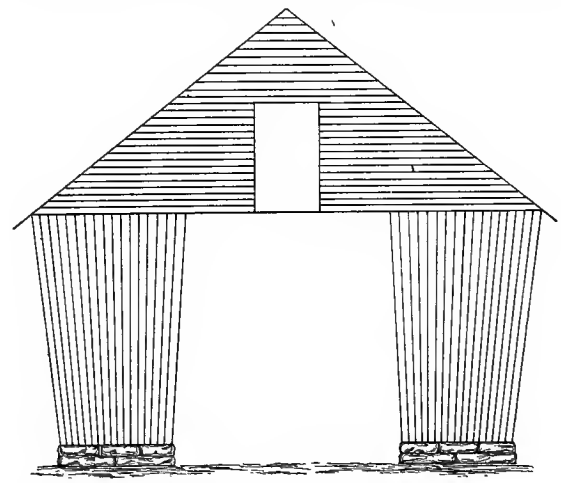


FIG. 212—CORN CRIB (END VIEW).

nor are the posts too heavy to prevent springing when the crib is loaded. The rafters are pine 2″ x 6″ and the sheathing is fencing 1″ x 6″; the gables are weatherboarded with poplar. The

posts are 12′ long, 6″ x 8″. Ties are 12′ long, 4″ x 8″, three to a post. There are four ties 6″ x 6″ 26′ long which are tenoned into the outside posts and receive in a mortise the inside posts. This makes the inside of each crib one foot lower than the plate on which the rafters rest and makes it easier to fill the crib. If the crop is heavy set a board on edge, making the inside of crib as high as the outside. The driveway is closed by sliding doors, which locked makes a safe store for the corn crop. The narrow slatted cribs have also perpendicular ventilators placed in front of each receiving window where corn is likely to pack and mold if at any place in the crib. These ventilators extend from floor to roof.

While the narrow crib is needed in moist Eastern climates farther West this crib may very well be widened to 8′ or even 10′ at the bottom. It is worthy of note that when pine lumber must be used and rat-proofing is desired it may be secured by lining the inside of the crib with wire netting of about ½″ mesh. This is not expensive.

TOOL HOUSE AND WORK SHOP.

A model tool house should be of generous size, so that machines may be put away without much labor; it ought to be as easy to unhitch in the shed as out of doors, else men will be apt to leave machines out. The shed illustrated in Figs. 213 and 214 is merely a great umbrella with posts one way 30′ apart, the other way 12′ or 16′, no side to it at all, so that there is nothing in the way of driving into it at any point. Putting the main machinery in the inner parts leaves the over-hanging roof 10′ wide for wagons and as it is 10′ high there is no difficulty in driving under to unhitch. Buggies may be sheltered on the shady side and if it is feared that snow would drift into them one or two sides may be boarded up. This is not designed for a house for fine carriages, which should of course have a tight dust-proof building.

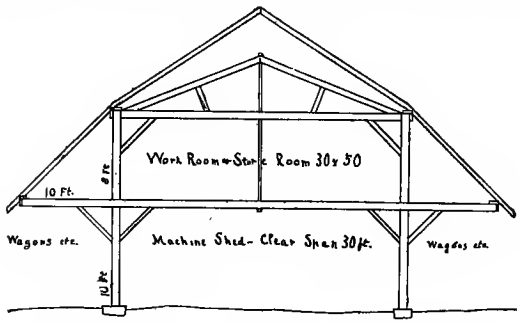


FIG. 213—TOOL HOUSE AND WORKSHOP (CONSTRUCTION).

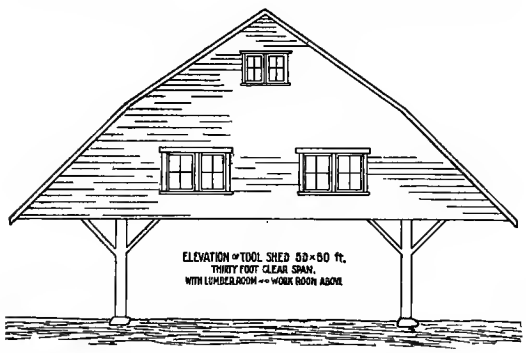


FIG. 214—TOOL HOUSE AND WORKSHOP.

The work-room above will hold a lot of smaller tools, be a good place in which to mend harness, make gates, repair machinery or store seed grain. By putting the truss above it with an inch truss-rod coming down to the cross-beam there is given a clear span of 30′ in the shed below. The whole thing is built in joint construction, posts 2″ x 8″, in two pieces, built up solid below the cross-beam, this made of three pieces of 2″ x 12″, spaced 2″ apart, box plates of 2″ x 10″, bridge truss of 6″ x 6″, rafters of 2″ x 4″ or 2″ x 6″, according to whether they are ever to hold much weight.

The work-room should have a bridge stairway wide enough and sloping enough to take up a vehicle if necessary for repairs or painting. This may be in any bent that is most convenient. The floor may be of hard earth or cement; the posts rest on stone pillars. Put on a shingle roof that will not be too hot in summer. If there is too much room in this upper story finish off a room for an extra hand to use now and then.

A CONVENIENT TOOL SHED.

It is difficult to keep things in their places unless one has provided places for them. On any ordinary farm there is a great collection of machinery, wagons, plows, harrows, drills, rakes, mowers, binders and what not which are generally supposed to be stored on the barn floor or in odd corners of other buildings. Too often they are left out under the sky. Yet it is not difficult to keep them sheltered and in a place where they will be convenient of access, not in the way and easily put in their places. Fig. 215 shows such

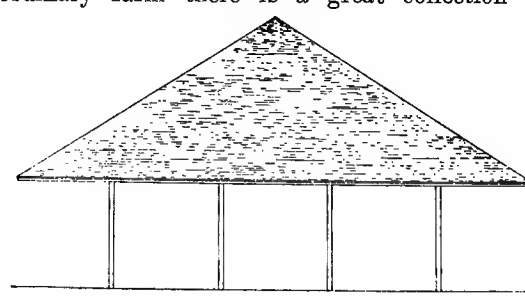


FIG. 215—A CONVENIENT TOOL SHED.

a building. It has no sides but is simply a roof of pyramid shape, projecting on each side 10′ beyond the posts, being 56′ square over all. Under these projecting eaves the farm wagons may stand and in the middle spaces the machinery may be stored. Any machine may be driven to any part, as there is nothing to interfere with driving through in any direction. There is much satisfaction in storing machines in a building by themselves; they are not in the way, nor are they in danger of injury from contact of animals or wagons. There is no danger of fire in such a building as this. Protection from sun and rain alone is needed. The posts are 6″ x 6″, set on stone; the roof is of shingles.

A TWO-STORY DOUBLE CORN-CRIB.

The double crib with two stories and two driveways shown in Fig. 216 is about 30′ wide, each crib being about 10′ wide and 20′ deep and 60′ long. Built of these dimensions it will hold

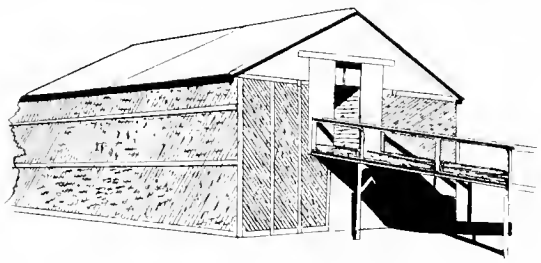


FIG. 216—A TWO-STORY DOUBLE CORN CRIB.

about 7,000 bushels of corn on each side of the driveway, but on most Western farms it will be built 12′ wide rather than 10′, which will considerably increase the capacity, without adding materially to the expense.

JOIST FRAME HAY BARRACKS.

Where hay is to be stored under roof and no stock to be provided for this simple frame (Fig. 217), which is easily made all of 2″ stuff or of part round poles if desired, commends itself as being simple, strong and cheap. There should be braces running the long way of the building at the same angle shown in the cut to protect against winds. The artist fails to show all the details of the curb roof, which must be tied together by collar-beams at the peak and effectually tied at the angles of the rafters. Reference to roofs of barns shown in more detail will explain the roof and how the plates are put on.

CEMENT AND CONCRETE WORK.

There is no material for floors in stables, cellars and out-houses comparable with cement. It is cheaper and cleaner than wood and properly made will last forever. Failures in the use of cement have come from the employment of inferior materials or from ignorance of the process of making it. To make a cement floor in the stable remove enough top soil to get down to where it is firm. A layer of coarse gravel or broken stone should be applied and rammed down. This serves for drainage and keeps frost from affecting the cement. The concrete may now be prepared. Concrete is made of finely-broken stone, sand, gravel and cement. If you do not have the broken stone, gravel will answer. Take five bucketfuls of gravel and one bucketful of cement and build up the contents in a conical pile on the floor. Shovel it over carefully three or four times to mix it thoroughly while dry. Continue mixing it in this way and sprinkle it slowly with water. Mix it until it is moist but not sloppy. It is now ready to use. Spread it down and with a heavy rammer pack it thoroughly. The better it is packed the better the floor will be.

The thickness of the concrete will depend on the use to which the floor is to be put. From three to six inches will usually be satisfactory. Where the floor comes against the side of the trench or manure ditch there should be a plank placed at the side and braced solidly to hold the material in place. A loose two-inch plank may

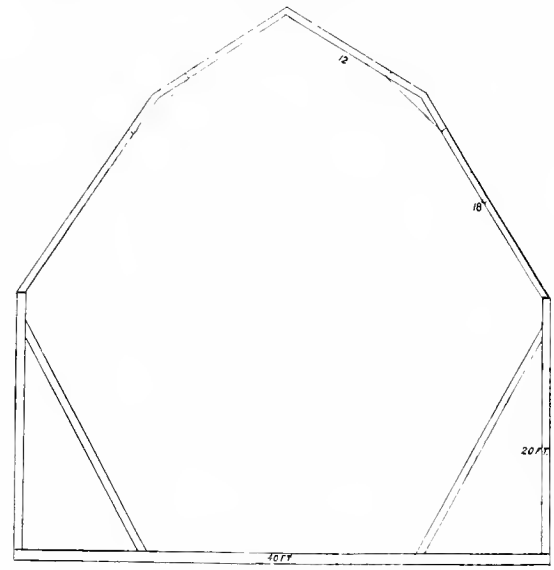


FIG. 217—JOIST FRAME HAY BARRACKS.

be used between the restraining plank and the concrete, which, after ramming the latter, may be taken out, leaving the surface finish to form the face of the offset. The material used in making this surface finish consists of two parts of clean sharp sand and one part of cement mixed thoroughly while dry and then wet carefully,

rammed again until it is solid and then smoothed with the trowel. If of the proper consistency it will appear rather dry when laid down but will be moist after it is rammed and troweled down smoothly. After it has been troweled it may be sprinkled with coarse sand to make the surface rough. If it is desired to make it rougher shallow grooves may be made by pressing down with a short piece of fork or hoe handle. The thickness of the finishing layer should be from one to two inches.

Foundations and pillars for buildings may be made of cement; walls for sheltering barnyards, floors of porches, walks and even entire barnyards are sometimes covered with it in order to avoid the mud that frequently is found in such places. Cement should be used quickly after it is wet and not be disturbed while drying. It should always be of best quality. To prevent it from becoming too dry while "setting," especially if exposed to sun, sprinkle it several times.

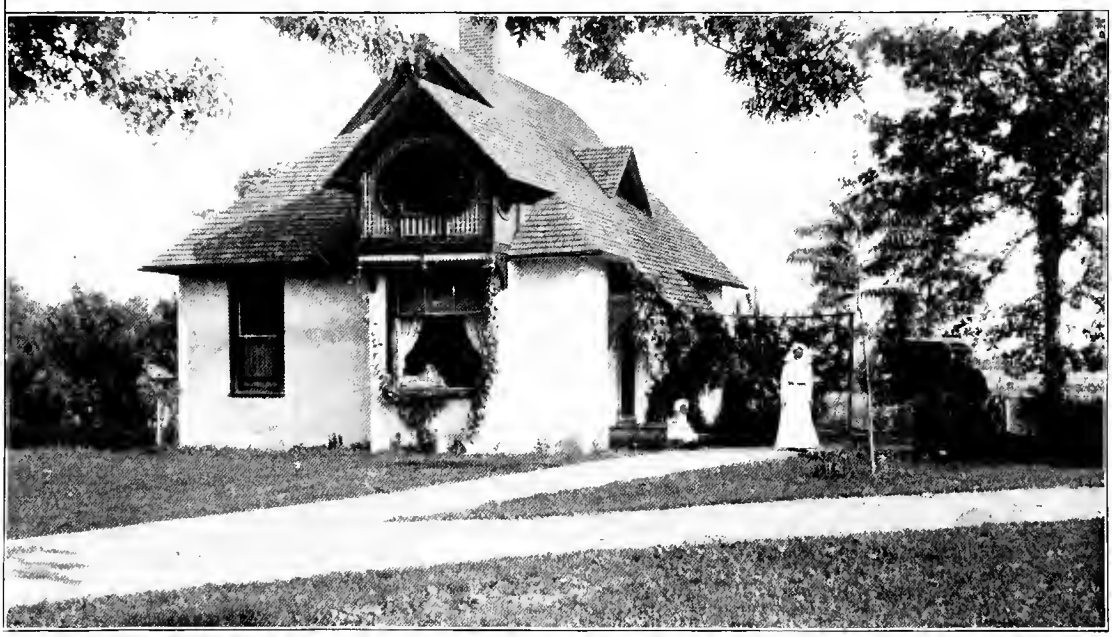


FIG. 218—A PLASTERED HOUSE.

THE USE OF OUTSIDE PLASTERING.

To put plaster on outside walls with common laths one must have first a solid backing of some rough lumber; any dry stuff will serve but pine is to be preferred, as it is not apt to warp. Space the laths out from the side of the building about ¾". Nail them on 1½" apart.

The best way to plaster the outside of buildings is to use common poultry netting, that of an inch mesh being best, although good results are had with coarser mesh. This woven wire comes in rolls. It is put over the wall of the building, spaced ½" away, or if a very warm wall is desired, ¾", and stretched tight. The best way to put it on is to unroll and hang it as wall paper is hung, fastening the top first, then one edge, then by using 6 or 8-penny nails, starting them slanting in the edge of the netting, it may be stretched sideways. This stuff can not be stretched lengthways but may easily be stretched taut sideways. It is kept away from the wall by the use of laths running vertically, 2′ apart. Light staples 1" long hold it in place and if it should pucker anywhere it is held down by a staple. Screws 1" long are used to hold it away from the building; the mesh-wires are placed in the slot of the screws; the staple holds them there and a tap of the hammer drives it down right. The netting is put on rapidly and is cheap. Being galvanized it is very durable, especially when incased in plaster.

The plaster should be made of good fresh lime and sharp sand. It should be made up in large amount before the plastering is begun so that all colors will be alike. It should not be rich in lime but should be made as though for mason's mortar. It is put on as over laths. It is best to apply two coats, the first barely hiding the wire and a thin coat over that before it is thoroughly dry. This will fill and hide all small cracks. When it is completed the wire is imbedded in the middle of the thickness of the

plaster. It can not crack; it can not peel off, for the wire being firmly stapled to the wall holds it solidly in place. As time goes on and the wall gets wet and dry again the mortar becomes harder and harder until it is like stone. It is warm in winter and cool in summer.

There is yet another use for outside plaster. That is for covering out-buildings; poultry houses plastered outside and in are warm, sightly, easily kept free from vermin and cheap. There need be but one thickness of boards and the wire stretched over it on each side or common laths may be used for the inside. The cost of this sort of plastering is about double the cost of painting once. A better plaster is made of Portland cement one part, clean sand two parts. This hardens into a cement impervious to moisture. Fig. 218 shows a farm cottage plastered according to the foregoing directions.

CEMENT FLOOR IN HOG HOUSE.

Fig. 219 shows the cross section of a hog house 24′ x 60′ with a cement floor. The floor is made in two levels, 1′ lower in the middle than at the sides. By this means a dry clean feeding floor in front and a dry clean sleeping floor back are insured with a space in the middle to collect all droppings and moisture. Bedding should be used and absorbents. The trough should extend along the front and be of cement 10″ deep and the front

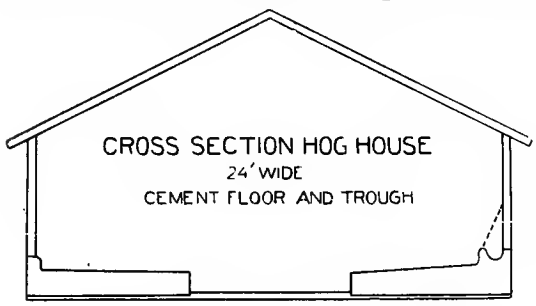


FIG. 219—CEMENT FLOOR AND HOG HOUSE.

by the trough should be hinged so as to open inwardly enough to lock at the front side of the trough, thus shutting the swine away from the trough while it is being cleaned and food put in. The trough should be divided at intervals of about 16′ so that liquid feed cannot run away. The cement should extend upward 1′ to form the foundation wall and the superstructure of wood anchored to it by ¾″ bolts imbedded in the cement.

CONCRETE FLOOR FOR HOG HOUSE.

The bottom to receive concrete should be solid, so that it will not settle in holes nor out of the original level. It must be so that no water can stand under it, as it will freeze in winter and heave up the floor, of course cracking the concrete. It is best to remove a few inches of top soil and tamp well the surface that is to receive the cement. The general way is to excavate eight to twelve inches and fill with gravel. But if the floor is protected from water getting under it the gravel is not necessary.

The best concrete is made from broken stone, gravel and coarse sand. Mix dry 13 parts gravel, 6 parts sand, 6 parts Portland cement, then when thoroughly mixed, add water to make a stiff paste. Then take 27 parts broken stone, thoroughly drenched with water, so that all fine dust may be washed out and mix the crushed stone with the other until all is incorporated with the cement.

In laying cement it is best to divide the floor into squares of 4′ or 5′ with 2″ x 4″ pieces firmly staked down. Fill every alternate square with the mortar well tamped down until the fine cement begins to come to the top. After it has stood a short time but before it is dry apply a finishing coat of half or three-quarters of an inch made of two parts sifted sand to one part of cement, smoothing down with a trowel. After setting it so as to be fairly firm remove the 2″ x 4″s and fill the other squares in the same way. If made in too large squares shrinkage cracks will occur.

To make concrete without the broken stone coarse gravel may be used but it will need more cement, say six or seven parts of sand and gravel to one of cement. There seems to be no hard and fast rule as to this. Only as much should be mixed at one time as can be immediately used.

After completion the floor should be sprinkled daily with water, which is necessary to complete hardening of the concrete. It is best to leave the studding around the outside for a long while. As to the comparative cost of wood and concrete much depends on the cost of the materials. In most places the concrete will cost from a quarter to a half more than wood but the concrete is for all time and is certainly more sanitary and easier to clean and keep clean.

CEMENT FEEDING FLOOR FOR HOGS.

A cement feeding floor for hogs may be built 12′ wide, as long as desired, with a slope of 1″

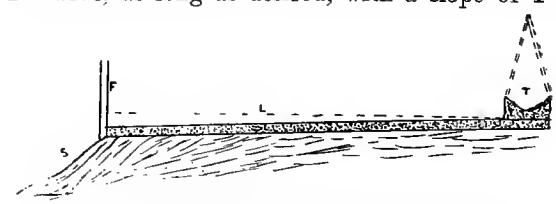


FIG. 220—CEMENT FEEDING FLOOR FOR HOGS.

in 12″ and preferably with a drop at the lower side and a cement trough at the upper side. A

cross-section of the ideal feeding floor is shown in Fig. 220. Let the floor be in plain uninterrupted sunlight, as sun is a sure destroyer of disease germs.

In the cut T is the trough and over it is a section of swinging fence that will close it from the hogs while the slop or feed is put in; L is line of level; F fence of woven wire to prevent hogs from crowding each other over the bank; S slope over which cobs and manure descend.

CEMENT ROOFS.

Joseph E. Wing, who has used cement roofs for several years with success, says of their construction:

First the roof needs to be strong and the roof boards should be well nailed down. The weight is a little more than that of slate, as the cement is put on about ¾″ thick. It must be put on a month before freezing weather. The manner of doing it is first to spread down a thin layer of cement mortar in a strip about 3″ or 4″ wide up and down the roof. Before this strip is much set unroll upon it a strip of galvanized woven wire poultry fencing, 1½″ mesh, spread it out and staple it down only as much as is needed to make it lie flat. Now spread another layer of cement over this, hiding the wire, and trowel it down smooth. Continue until the roof is covered. It should not be of steep pitch, though cement may be applied over old shingles on ordinary roofs. When it begins to dry sprinkle it frequently. A layer of straw or chaff 2″ thick will serve to keep it moist and it is better if it dries out very slowly; if sprinkled well every day for a week all the better. After it is set there will appear some small cracks; these may be filled by sprinkling the surface with equal parts of cement and fine sand, about ⅛″ thick all over, brushing it with a broom to get it in the cracks, then sprinkling with water and spreading with a whitewash brush. Use the best Portland cement for this work—one part of cement and two parts of very clean sand. It makes a cheap roof for cattle sheds, poultry houses and the like and is a cheap way of repairing old shingled roofs. Should it crack a little the second year it may be washed over with a trifle of pure cement which will stop that. Further test is needed before it is to be recommended for dwellings or main barn roofs.

CEMENT WATERING TROUGH.

Cement or concrete watering troughs are fast supplanting the fast-decaying and ever-ready-to-leak troughs. Of the former two types are shown in the accompanying illustrations. Fences, walls, floors, troughs and well coverings all decay. Therefore the coming of good cement at a low price is doubly welcome to the farmer. It seems now that he may do things so well that they will stay done through several generations and at slightly greater expense than the temporary makeshifts to which he has been accustomed.

Use the best cement. Cheap cements are not worth the using. Get clean, sharp sand and gravel. If there is earth or loam in it it will not make good cement. Broken stone is excellent but it needs a proportion of sharp sand or finely-crushed stone to fill the interstices of the broken stone. The stone and cement or gravel and cement must be mixed in right proportions. There should be just enought cement to fill all interstices in the sand and gravel; a very little more to allow for poor mixing is safe. The amount needed may be ascertained by the water test. Taking a measure of dry material, such as

FIG. 221—CEMENT WATERING TROUGH.

crushed stone, sand or gravel and another measure of same size filled with water, pour the water into the stone until it will absorb no more. Note what proportion of the measure is emptied of water. Use a little more cement than you have water and the proportions will be proper.

For watering troughs use good clean gravel with a natural sand admixture, one cubic yard to one barrel of cement. For street work, curbstones and the like, ¾ of a barrel of cement are used to a yard of gravel.

Mix the materials thoroughly while dry. Have a long mortar box. Shovel the mass of gravel and cement into a pile, as narrow and high as it will lie. Beginning to take it away from the bottom, shovel it over again, taking each shovelful from the floor and placing it carefully on the very apex of the new pile. Thus it rolls down evenly on each side and secures quite intimate mixture. Shovel it back and forth three or four times before adding any water. The better the mixture the better the concrete will be. In wetting it down use a large sprinkling can for adding water and do not wet it enough to make it run; stir as water is added and stop when it is wet enough to be merely well moistened but not sloppy. When it is hard-rammed in the mould a little moisture should rise to the surface. The

harder the ramming the better the work will be. Use the material as soon as wet. If any stands till it becomes somewhat set throw it away or use it for some unimportant job. Wetting again will not restore the life of set cement.

To build a watering trough, remove the top soil down to where it is firm, say 8″. Build a box the size of the outside of the trough, say 4′ x 12′ and 3′ high. Make it strong to resist pressure when cement is rammed against it, setting stakes at the sides and tieing across the top. Put in the bottom a layer of concrete about 4″ thick and through it insert a drain pipe, and an inlet pipe. Make the drain pipe 1½′ with coup-

FIG. 222—CEMENT WATERING TROUGH.

ling, coming just flush with the floor of cement. Into this coupling screw a short standpipe, so that into this the overflow will discharge and when it is unscrewed the whole tank will be emptied. Make this short standpipe to screw in easily and keep the threads greased. (See Figs. 221 and 222.)

Do not try to fill up the tank with concrete high enough to allow stock to drink out all the water. Water is the cheapest material with which to fill the bottom of a trough. Make an inner form with sloping sides so that the wall will be 6″ thick at the top and 16″ thick at the bottom; put in place and fill with concrete and pound it down as hard as possible. Do this before the bottom has become thoroughly hard. When it has set a day or two take off the wood carefully and wash trough well with a mixture of equal parts pure cement and pure sand, using a fairly fine clean sand, or cement alone. Put it on with a whitewash brush. Sprinkle the work twice a day and when a little hard carefully fill it with water.

FEED RACKS AND TROUGHS.

A PRACTICAL FEED RACK FOR SHEEP.

Cheapness, simplicity and effectiveness are the three strong points of this rack. Fig. 223 shows the construction. The end pieces are of 2″ x 6″ pine, the bottom boards are of 1″ x 12″ and the top boards are set at an angle and leave a wide opening through which the hay descends and plenty of room for the sheep to thrust their heads in to eat. This form of rack gives the animals easy access to every bit of the feed and prevents any waste of consequence, for when

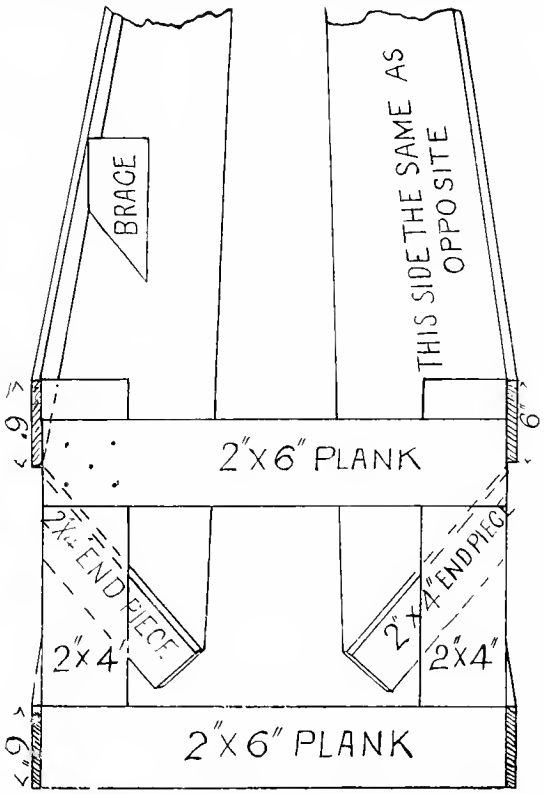


FIG. 223—A PRACTICAL FEED RACK FOR SHEEP.

sheep can thrust their heads in they let them remain there and eat without drawing the hay out and trampling it under foot. In general this rack is built without a bottom, though if it is desired to feed grain in it there may be provided a tight bottom, putting it about midway of the bottom board. It is better to provide separate troughs for feeding grain.

GOOD IDEA IN FEED RACKS.

The cuts Figs. 224 and 225 are self-explanatory. By hitching a team on one end of this unique rack it can be moved very easily. The 18′ ark holds 1,000 pounds of hay or one ton of sorghum. The frame-work is made mostly out of 2″ x 4″ except the runners, which are 2″ x 6″. The rack is 18′ long, as shown in Fig. 225.

A SELF-FEEDING MANGER AND STALL.

This stall-manger plan can be used in nearly any form of building. The stalls being only 3′ to 3′

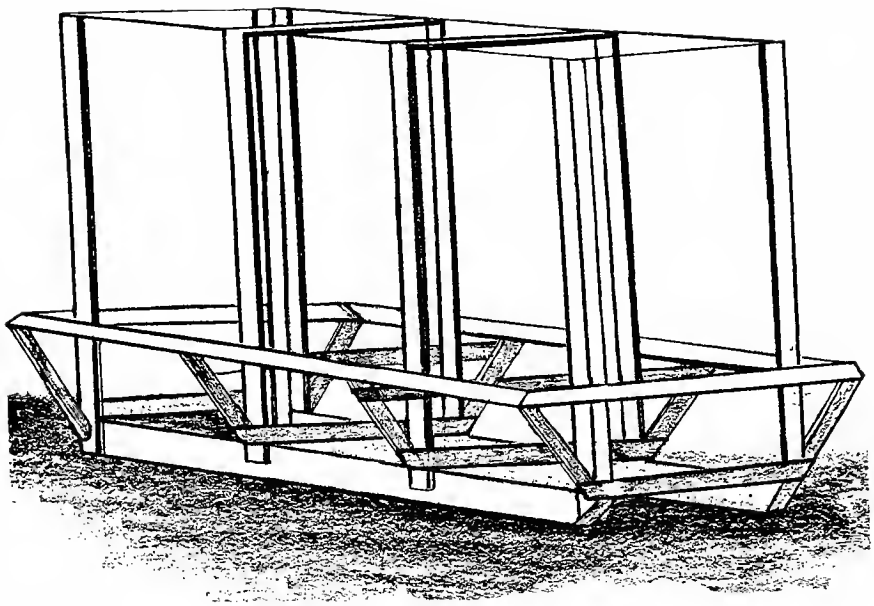


FIG. 224—GOOD IDEA IN FEED RACK (CONSTRUCTION).

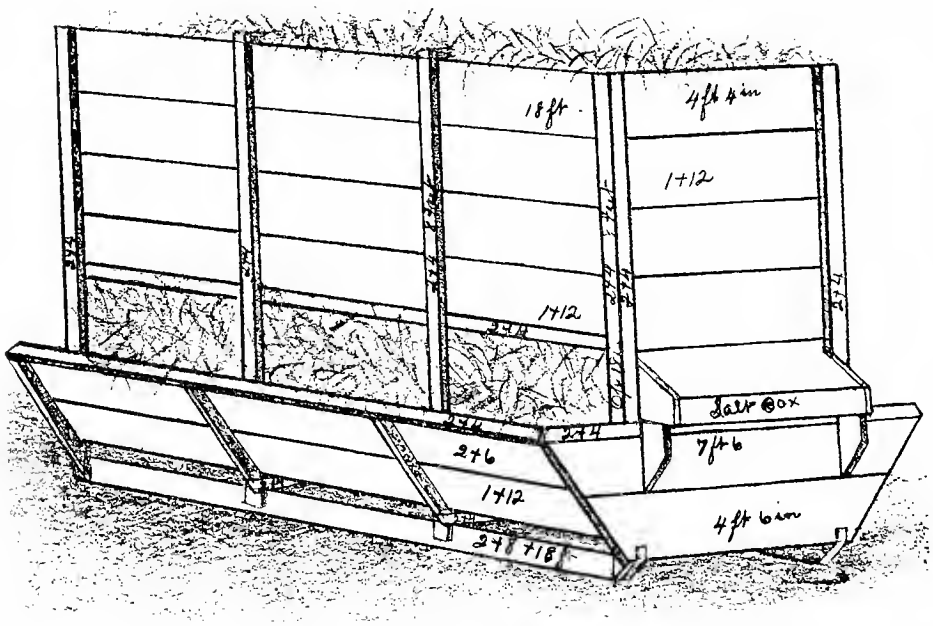


FIG. 225—GOOD IDEA IN FEED RACK.

4", as may be preferred, in width and coming out 2' from the manger, the front edge of stall being perpendicular as shown in Fig. 226, there is no danger of animals getting hemmed in or injured in any way.

On the outside of the building above the top of the manger there is an opening in the siding for feeding silage, ground grain, bran, cottonseed-meal and the like. This is closed by a shutter turning up or down as desired. The stalls should be braced from near the end of the 2" x 4" support of manger to near the middle of manger and closed between the brace and side of the stall so that stock can not get their feet fastened. Fig. 226 is thus described: A, A, hay chute 2' wide, continuous with building. B. outer door to feed

silage or grain of any sort without disturbing cattle; track hung out from siding may carry

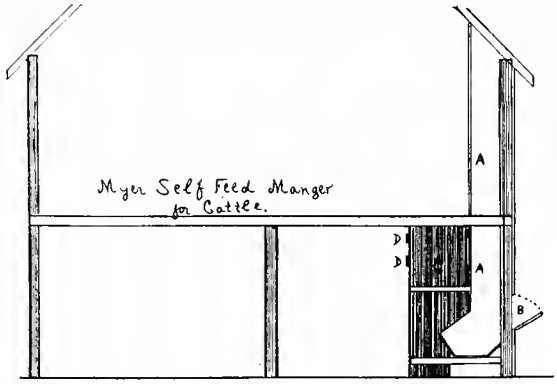
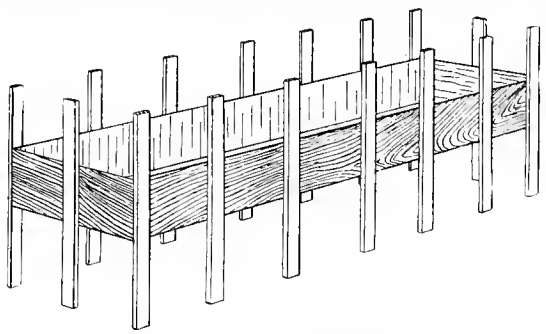


FIG. 226—A SELF-FEEDING MANGER AND STALL.

car to distribute silage. C, wooden partition between stalls; partitions 36″ to 42″ between centers, 44″ from hay chute to outside of partition;



FEEDING TROUGH FOR CATTLE.

outer piece of partition should be 2″ x 6″ firmly fastened to stub-post set in ground. D, two boards 1″ x 6″ to brace the upper part of partitions.

SELF-FEEDER FOR CATTLE.

Herewith is a diagram (Fig. 228) of a self-feeder for cattle that can be built on posts or built on runners of 4″ x 8″ pieces, so that it can be moved more easily. The troughs should be 2′ wide and have a space of 1½″ at the bottom of feeder for the corn to run out into the troughs.

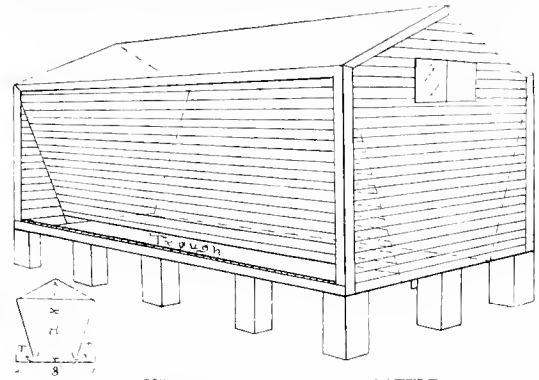


FIG. 228—A SELF-FEEDER FOR CATTLE.

The 2″ x 4″ pieces on the side should be 8′ apart at the top and 4′ at the bottom, so the sides will be slanting.

A GOOD SELF-FEEDER.

The self-feeder for cattle shown in Fig. 229 is for an open feed-lot or pasture. When cattle are made to put their heads through spaces like

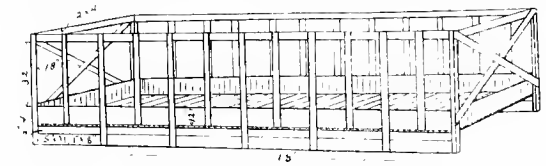
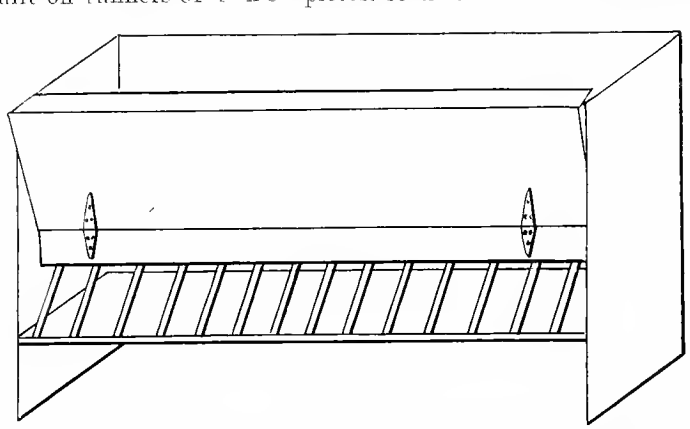


FIG. 229—A GOOD SELF-FEEDER.

this to eat their food much outside wastage is saved. The dimensions of this feeder are about right for cattle weighing, say, 1,000 pounds. In making it use bolts freely.

A SHEEP RACK.

The sheep rack shown in Fig. 230 has been used with satisfaction at the Iowa Experiment Station. The rack is 8′ long, 18″ wide and 38″



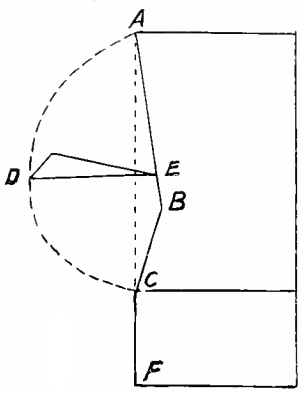
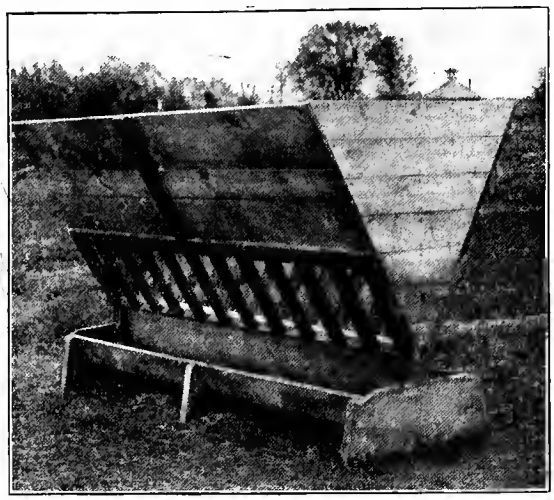


FIG. 230—SHEEP RACK.

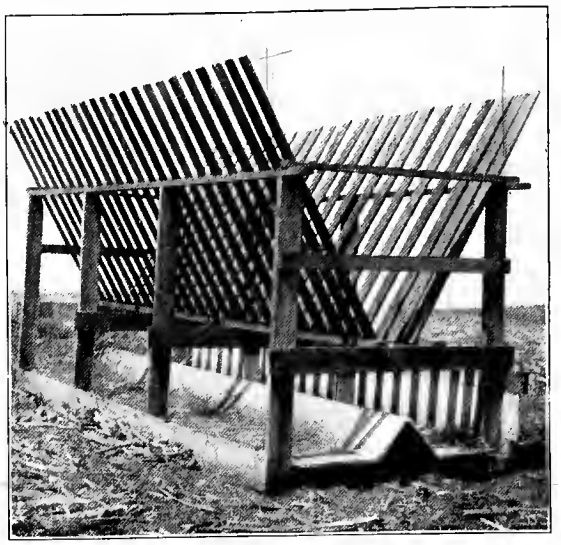
high. This size is found convenient for small pens, but any size may be used to suit the requirements. Economy of time and material may be gained by making the rack a little wider and feeding from both sides. Fig. 230 on left gives a side view of the rack as used for feeding hay, on



A WISCONSIN HAY SELF-FEEDER FOR SHEEP.

right an end view, showing operation of grain trough and explaining method of construction.

The bottom of the rack (C) is 14″ from the ground floor. The front is boarded tight from A to B, a distance of 14″ and slopes inward, making B 4″ inside of the perpendicular line A, C. A 3″ strip extends across the front joining onto the bottom to prevent the chaff and seeds from being worked out. The space from C to B (8″) gives the sheep access to the hay, and is separated into 3″ spaces by narrow cleats, as shown on left. The grain is fed in a trough consisting of two boards joined together, as shown in end view, one being 6″ and the other 12″ in width and both of the same length as the rack. The trough is attached by hinges to the front of the rack at a point midway between A and C and can be low-



PORTABLE FEED RACK.

ered for grain-feeding and fastened up out of the way when the grain is eaten, as shown in Fig. 230. All lumber used should be planed on one side at least and the grain trough should be planed on both sides. The hay-rack of itself is a good one and gives good satisfaction used alone. The grain-feeding attachment is easily and cheaply made, occupies no room when not in use and makes the rack complete.

SHEEP-FEEDING RACK.

Into the rack shown in Fig. 231 hay falls to the sheep as they eat it and they do not nose

SHED FOR HAY FEEDING.

it all over, and lambs may run there without being on top of the hay all the time. This rack is to a certain extent a self-feeder, and though it is not recommended to feed sheep in any other way than what they will eat at one time it is an advantage to have a little hay left for the

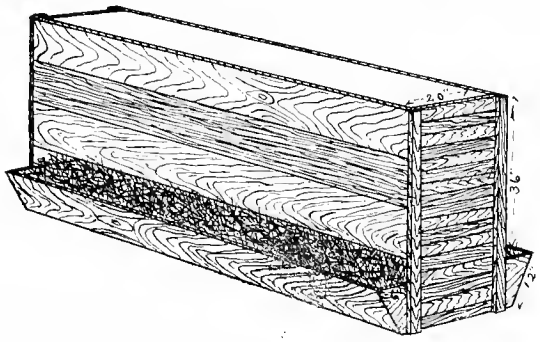


FIG. 231—SHEEP-FEEDING RACK.

weaker ones. They waste very little hay with this rack and as it has no bottom it can be raised and then moved by one man. The frame is made of 2″ x 6″s edgewise; for the block at the bottom saw 2″ x 6″s diagonally; nail 12″ board along the

SELF-FEEDER FOR SHELLED CORN, MIXED GRAINS OR GROUND FEED.

bottom lengthwise, then take three 10″ boards and nail up the front; set the bottom 10″ level with the 12″ or about 1″ higher; make the rack with a frame about every 4′, omitting cross piece except at the center, and this is not necessary unless the rack is to be moved about. For rack to feed only one side make 18″ between studs. The sides may be made separate and set against light posts. Do not nail, but wire so they can be raised.

A HAY SELF-FEEDER.

This is a combined feeder and windbreak. The hay ought in any event to be covered and a little additional roof covers the cattle as well. A cross section of the feeder is shown in Fig. 232. Corn or bran or any ground feed may also be fed in the bottom on the tight floor. The posts are set in the ground. Galvanized steel corrugated roofing is used. Such a feeder and windbreak along the cold side of the yard would be useful on many a farm to hold bright straw, shredded fodder or hay.

CATTLE YARD AND SELF-FEEDER FOR HAY.

The feeding of cattle in open yards is commonly practiced, yet shelter pays well. Small

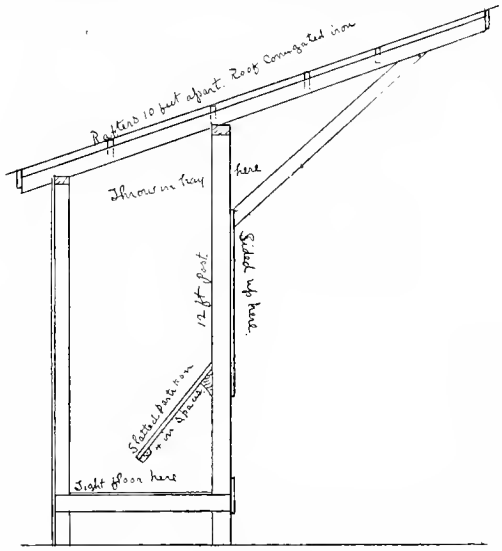


FIG 232—A HAY SELF-FEEDER.

yards too are recommended and they may be paved to advantage. (See Fig. 233.)

The hay feeder shown in Fig. 234 holds two loads of hay which is all eaten without waste.

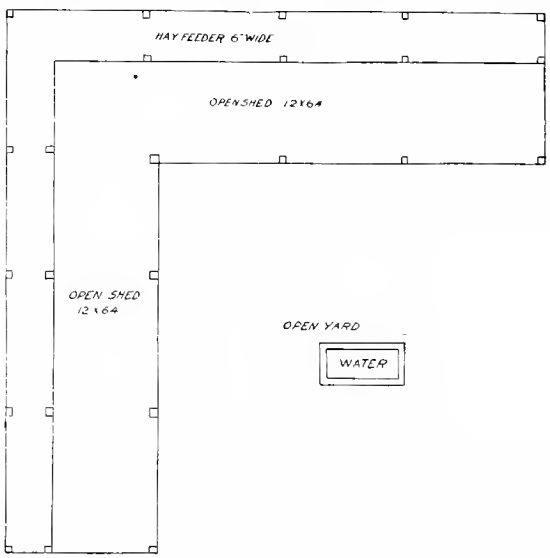


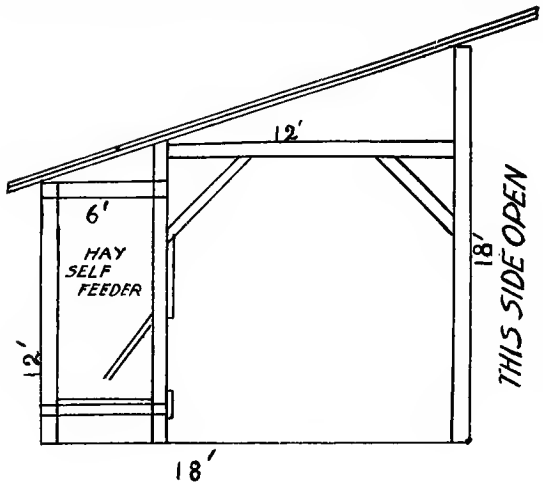
FIG. 233—CATTLE YARD AND SELF-FEEDER FOR HAY (PLAN).

Corn boxes are set under the roof, leaving room to drive between them and the hay feeder. The

yard need not be more than large enough to complete the square, then all manure is saved and less litter needed to keep it dry.

COMBINED HAY AND GRAIN RACK.

The cross section of this rack, shown in Fig. 235, explains its construction. It is a corn box,



CROSS SECTION
FEEDING SHED

FIG. 234—CATTLE YARD AND SELF-FEEDER FOR HAY (SECTION)

very strongly made to resist the pushing of big cattle, with added hay slats spaced 4″ apart to hold hay. What is pulled through mostly drops

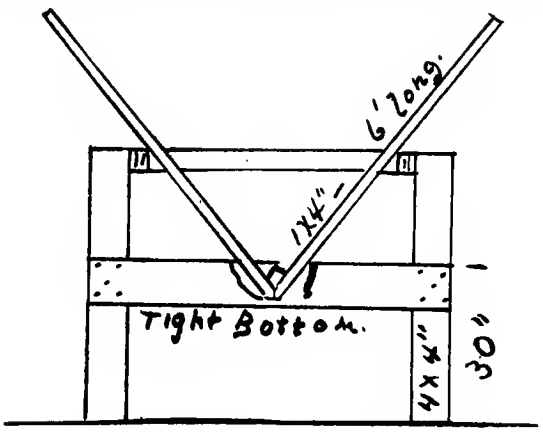


FIG. 235—COMBINED HAY AND GRAIN RACK.

in the boxes and is consumed or may be thrown back into the rack. The tight bottom admits of the feeding of any kind of grain.

FARM FENCES.

Fences have been used in one form or other ever since men engaged in the pursuit of stock raising. In ancient times the sheep were sometimes corralled in enclosures made of tenting. Afterwards came the stone fence, the picket fence and the zigzag rail fence that are now relics of the past.

The three kinds of fences that are in general use today are the board fence, the barbed-wire fence and the woven wire fence. Barbed-wire has been used quite extensively but it is no doubt nearing its end of service, since at the present time the woven wire fence either alone or in combination with the barbed-wire is coming more

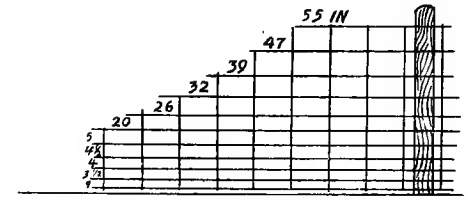


FIG. 236.

and more into use. The woven wire is proving to be a very substantial fence and one best suited for ordinary farm fields.

FENCE POSTS.

Corresponding to the foundation of a building are the posts which are necessary in the construction of all fences. The cost as compared with the durability of the post is the thing to be considered when making the selection of posts.

Of the wood posts red cedar gives the best service. Good cedar posts cost from 15 to 20 cents apiece. While oak posts are cheaper they

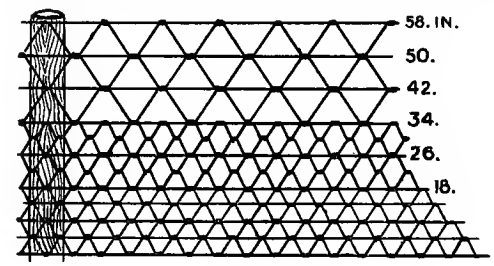


FIG. 237.

are shorter lived than cedar and are disagreeable to work with because they are so hard. In parts of the country where stone can be quarried, stone posts are often used. They cost from 25 to 50 cents and are very heavy to handle but when once in the ground they are there to stay.

Wooden fence posts are becoming more and more scarce as the timber of the country is cut, and the price is constantly increasing. A substitute for wooden posts is now being introduced in the form of cement posts. It is the same material used in cement sidewalks. The claims made for these posts are that they surpass in smoothness of wear and freedom of cleavage

by frost or breaking by blows, as in the case of building stones. The posts are also claimed to be fire, rot, frost and rust-proof, much stronger than wood and to improve instead of degenerate with age. There are several different patterns of these posts on the market. The weight of the

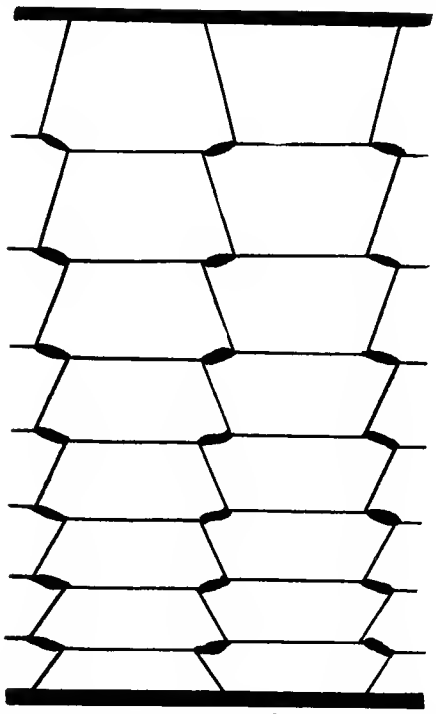


FIG. 238.

posts prohibits long shipments, but a farmer can make his own posts with the least possible outlay. One or two moulds and a level piece of ground covered with sand two or three inches thick comprise the necessary machinery.

The moulds made of cypress will cost about $3 each and those made of pine will cost about half as much. One style of these posts is 4½″ square at the ground line and tapers on three sides to 3″ square at the top and 3½″ square at the bottom, and also makes a small truss of the four wires which run lengthwise through the post. The post can be made any length desired, a 6′ post weighing about 50 pounds when cured. The approximate cost is about as follows: 1½ pounds No. 8 wire at $1.80 per cwt., 2.7 cents, and 8 pounds cement at 60 cents per cwt., 4.8 cents, (gravel and labor not included in the cost) would be per 6′ post 7.5 cents. A 6½′ post at this rate would cost 8.25 cents.

Small holes are moulded through the post parallel to the fence and in the direction which the

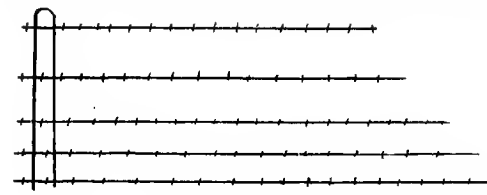


FIG. 240.

fence runs. Through these holes a short wire is run and wrapped around the wire of the fence at each side of the post; in the same way boards can be attached. The posts are claimed to be very strong. No. 8 wire is capable of holding a weight of 1,800 pounds. With four of them in the post it makes it almost indestructible. Also the holes through the post are behind the front wires so that should the cement be knocked off in front the wire would still hold.

The posts are composed of three parts sand and one part cement mixed thoroughly dry first and then wet enough to pound into the mould without becoming sloppy. Enough of the wet mixture is placed in the mould to make about 1½″ in

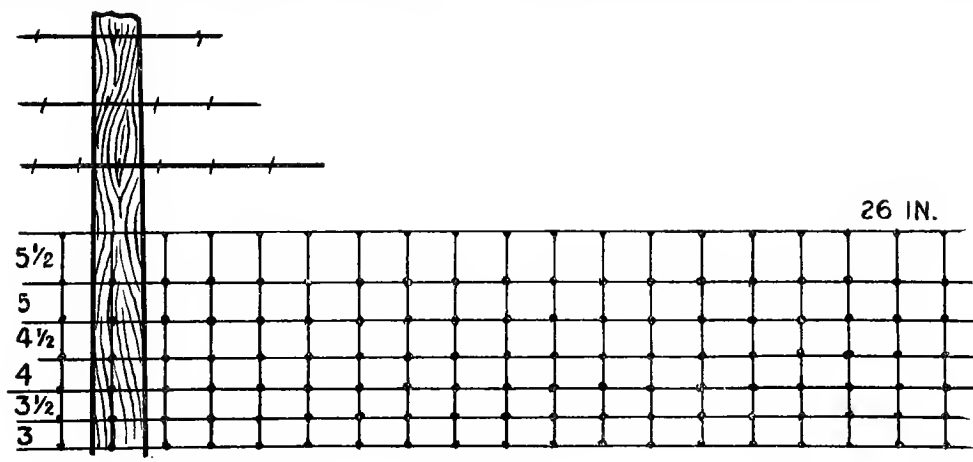


FIG. 239.

depth. Then it is pounded down. Two of the long wires with hooks on each end are placed in lengthwise with the cross wires to make the holes through which the tie wires pass. Next fill the mould to within 1″ of the top, place in two more longitudinal wires and tamp. Fill up the mould a little more than level and tamp again; smooth off and turn the post out on the wet sand floor to cure. They are moulded face downward and a groove runs through the center of the face in which can be placed a wire for lightning arrester. Keep posts moist for four days by sprinkling.

SETTING FENCE POSTS.

Next to the material is the manner of setting the posts. In building a fence it must be remembered that the end posts are the mainstay of the whole fence. These should be about 3″ greater in diameter and about 2′ longer than the intermediate posts. The hole for the end posts should be at least 4′ deep, if 5′ is to be above the ground, and should be 3′ square. In the side of the wooden post toward the end of the fence and about 7″ from the bottom end of the post a piece 2″x6″ and 30″ long should be spiked and fastened into a notch in the post cut for it. If for a corner another piece should be fastened above it and at right angles to the first. About 10′ from the end post in line with the fence another post about the same size should be set at the same depth. About a foot from the top of the end post and to a few inches above the ground on the other should be extended diagonally a wooden brace 4″x4″, being fitted into notches cut in the posts. Another brace of twisted wire should extend from near the top of the brace post to the bottom of the end post. The intermediate posts should be about 7′ long and 4″ to 6″ in diameter and should be placed 2½′ or 3′ in the ground and about a rod apart. All posts must be in perfect line from top to bottom, otherwise the tension will pull some of the staples. The wire should always be fastened on the side of the posts towards the field where the stock is kept.

Figs. 247 and 248 show the two very popular methods of bracing end or corner posts.

Figs. 236, 237 and 238 show cuts of woven wire fences constructed from galvanized wire. These fences are very serviceable and are sufficiently strong, and woven in a manner as to enclose cattle, horses, sheep or hogs. Some farmers prefer a combination fence as shown in Figs. 239 and 241. This is a good kind of fence for a hog pasture and will turn any kind of stock. In Fig. 239 is shown a combination woven and barbed-wire fence. This makes a cheaper fence than an all woven one of the same height, since the 26″ space covered by the three barbed-wires does not cost as much as woven wire 26″ high. Even with an all woven wire fence it is often advisable to have a barbed-wire on top, so horses will not reach over and bend down the wire on top of the woven wire.

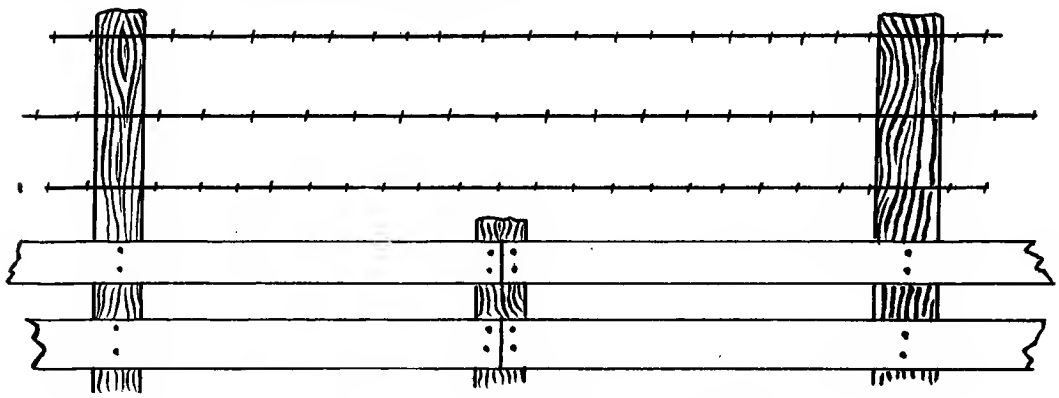
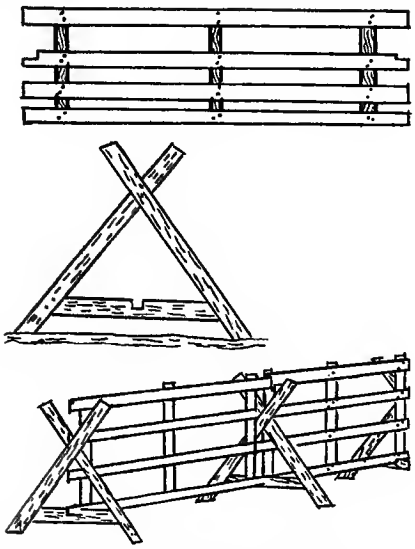


FIG. 241.

The old-fashioned board fence is rapidly going out of use and is now only seen around yards and short stretches near buildings where it is often better than wire. One hundred rods of the old board fence would cost $85 for the boards alone. It takes twice as many posts and is much more tedious to build, since the posts have to be set in in such a manner as to let the boards meet. This kind of fence completed would cost about $1.20 per rod. This puts it out of competition with the woven wire fence, since the best 54″ woven wire fence can be purchased for 65 cents or less per rod and is more sightly and serviceable.

Figs. 243, 244 and 245 show a strong hurdle fence composed entirely of ordinary fence boards. The triangular frames which serve as posts are each of two pieces of 1″ boards crossed and braced as shown in Fig. 244. The panels, Fig. 243, are 16′ long, each composed of four boards;

in setting up the fence each triangular frame supports the ends of the panels. The upper and lower boards of each panel interlock with the



FIGS. 243, 244 AND 245.

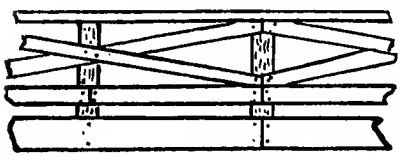


FIG. 246.

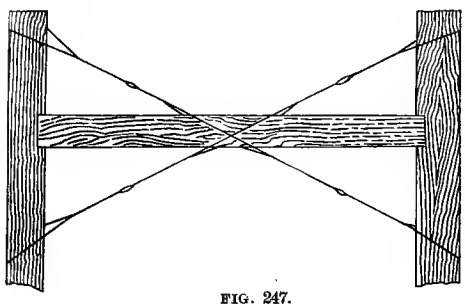


FIG. 247.

frame, as shown in Fig. 245, making a very strong fence. This is a very handy fence for fencing temporary pastures and is often used to divide a pasture from tilled land.

Fig. 249 is a windbreak and is used to enclose the barnyard or feed-lot. The fence is generally 8′ high but some prefer 6′. The boards should be on the side next to the feed-lot so that the stock by rubbing cannot knock the boards off. Although primarily this fence is a windbreak it is very valuable in that it hides the manure piles and general disorder of the feed-lot.

Fig. 246 represents another style, a very neat farm fence, rather preferable to the old straight fence. It saves one board to each length and by nailing on the two upper boards as shown in the illustration great additional strength is given. These boards not only act as braces but as ties

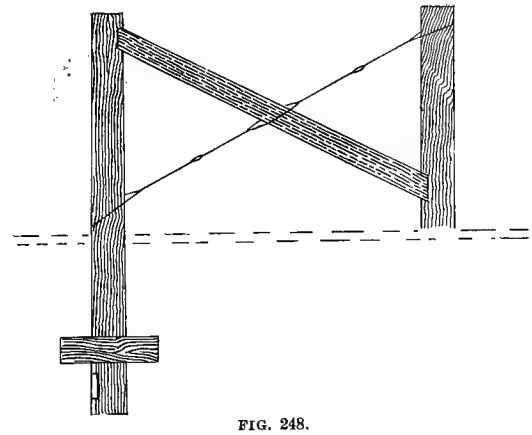


FIG. 248.

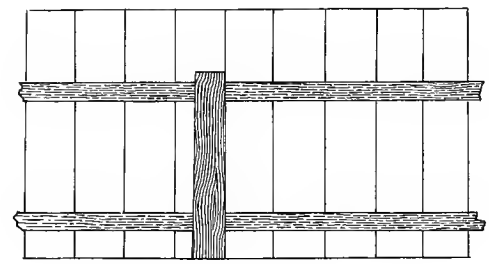


FIG. 249.

also, and a fence built on well-set posts and thoroughly nailed will never sag or get out of line until the posts rot off.

STONE ANCHOR-WALLS FOR FENCE.

Mrs. Virginia C. Meredith of Indiana submits the accompanying photographs that illustrate stone-anchor walls used with wire fence. These walls are built of boulders laid in cement; they are 8′ long, 2′ wide, 4′ 6″ above ground and 3′ under ground. In building them it was the intention to get something that would endure, that would stand plumb and at the same time be not unsightly. The expense is greater than that of putting in the best red cedar posts and braces, but on the other hand there is every reason to think that these walls will not only stand plumb but that they will last indefinitely. On a home farm it is worth while to make permanent improvements. To make the holes through which the wires pass (see Fig. 251) the stonemason in building laid gas pipe on a level at the required distances apart and before the cement hardened withdrew the pipe.

The fence shown in the pictures is of four barbed-wires, the top one being 50″ from the ground, the bottom one 16″ from the ground. The fence is an outside one and intended to

FIG. 250—STONE ANCHOR-WALLS FOR FENCE.

enclose cattle and horses upon a permanent pasture. To fence an entire farm for hogs seems a needless expense. The wire is fastened only at the two ends at the anchor-walls. It is fastened, after passing through the holes, to a stretcher or rachet by means of which it may be stretched as tight as desired. Between the end stone anchor-walls small red cedar posts are set 50′ apart or less, according to the surface of the ground. Upon the cedar posts are iron insulators through

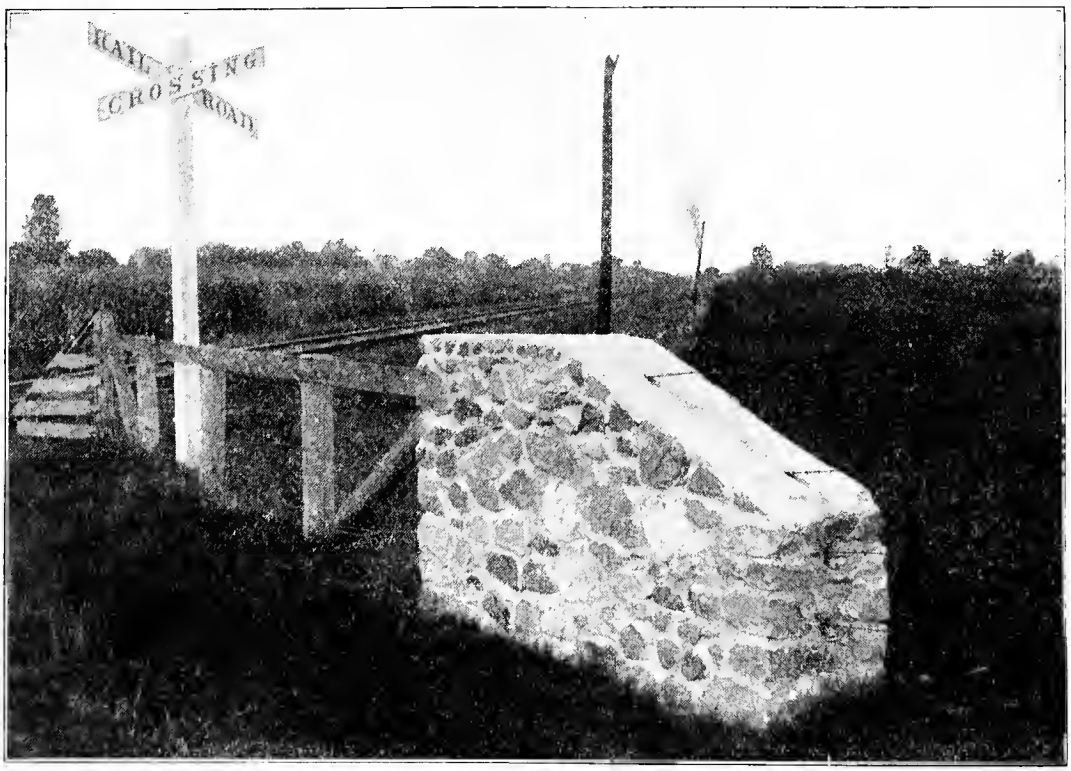


FIG. 251—STONE ANCHOR-WALLS FOR FENCE.

which the wires pass but are not fastened. Between the cedar posts the wires are held in place by steel stays at distances of about 10′. In a short line of fence, 100 rods or less, the wire is attached to the rachet or stretcher at one end only while at the other end it is wrapped around a vertical piece of gas pipe, as may be plainly seen in the anchor-walls at the gateway (Fig. 250).

Three things are necessary to a good fence—strength, elasticity and light weight. By using barbed-wire one gets the very great advantage of the cable in stretching as well as extra strength, while by using but four wires one certainly secures a fence of light weight. The barb itself on a tight wire is a harmless but effective warning to cattle and horses to let the fence alone. Barbed-wire, used after this plan of not stapling it to the post, is elastic enough to withstand any ordinary shock, such as a falling tree, because the force of the impact is distributed along the entire line of fence between the end anchor-walls.

A gate is always a source of weakness to a fence and a cause of care to the farm owner. The stone posts to which the gate is hung (Fig. 250) are 2′ 6″ square. The hinges as well as the latch piece were set in the cement as the posts were being built.

Mrs. Meredith says: "We are greatly indebted to the pure breeds for animals with little of the scrub propensity for jumping fences, consequently a fence 4′ 2″ high is ample safeguard for the stock usually kept on a farm. I have used a fence of the style here described for more than twenty years and with entire satisfaction. We seem not yet to have learned how to build farm fences. A ride through any section of the country reveals a succession of poor fences constructed after the vagaries of each particular owner. Hardly ever does one find a fence that stands plumb. With plank fences the great weight inevitably forces them to lean; with woven wire fences, in many cases, the wire used is so light and so poorly galvanized that in a short time it yields to the rubbing of stock and shows holes or else is borne to the ground. The usual barbed-wire fence seems to inspire in its owner a disinclination to replace a staple or mend a broken wire. The very best fence ever constructed was the old time split rail Virginia worm fence; it would stand plumb and would turn hogs as well as horses, but it is a luxury of the past, too expensive for modern farm economy."

A CONVENIENT PORTABLE FENCE.

It is often desirable to have a fence that may be quickly erected and as quickly removed. The fence shown in Fig. 252 is very cheap, strong and convenient. It is built of pine, 1″ x 6″ for the bottom rail and 1″ x 4″ for the top rails. The braces that hold it upright are of 2″ x 4″ and the base or cross piece is 2″ x 6″. The base is notched 2″ and the bottom boards notched as much, which makes a secure lock. This fence is easily made and is erected when needed as fast as the panels and braces can be taken from the wagon. As the base piece of the brace is apt to decay first it might well be made of oak and if set on two bricks or small flat stones it would be less affected by moisture of the soil. These panels

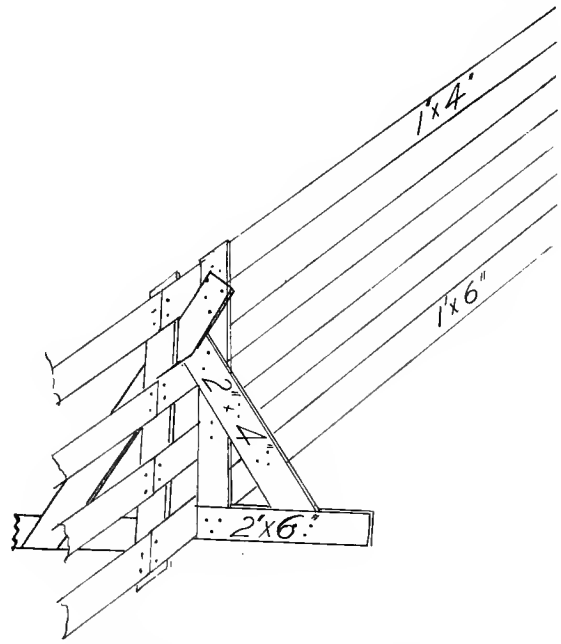


FIG. 252—A CONVENIENT PORTABLE FENCE.

must not be too long or they will warp out of shape, 12′ being long enough. Pine is better than oak because of the warping tendency of hard woods.

PORTABLE HOG AND SHEEP FENCING.

The cut (Fig. 253) shows a good type of a portable hog and sheep fence. It should be built of good material that will not warp nor rot readily. Put together with long wire nails, clinched, painted or treated with a wood preservative it will endure for years and form a ready means of enclosing a patch of rape or clover pasture.

PORTABLE HOG AND SHEEP FENCE.

The panels in the portable hog fence shown in Fig. 254 are made of 4″ fencing, 14′ long, with 6″ spaces between the boards—thus making a fence 3′ high by allowing the cleats to project 2″. If the fence is to be used for pigs the lower space

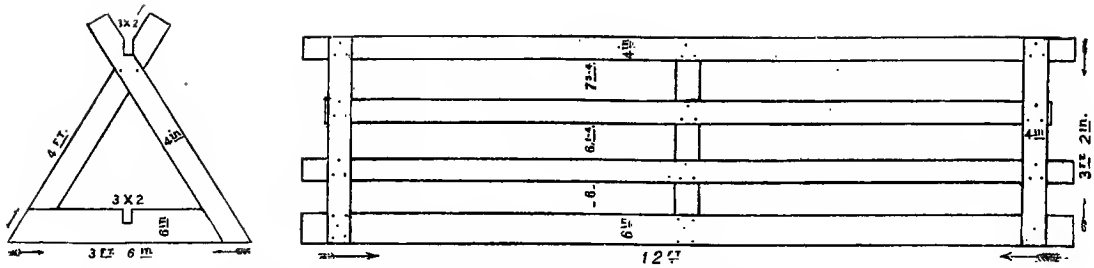


FIG. 253—PORTABLE HOG AND SHEEP FENCING.

may be reduced to 4″ and the upper one increased to 8″. This makes a better division for all purposes. The fence is held in place by triangular frames, as indicated in the drawing. The ends

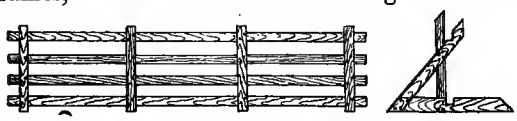


FIG. 254—PORTABLE HOG AND SHEEP FENCE.

of the panels overlap about 6″ and fit into notches for the top and bottom boards. The brace should be on the outside of the lot. This style of fence is very satisfactory for sheep and will serve the purpose of a temporary fence for hogs, though it is sometimes necessary to stake it at the braces.

Another portable fence (see Fig. 255) is thus described:

The panels are made of 6″ pine fencing 12′ long, with 4″ and 5″ spaces between the boards, as shown in the illustration. This makes a fence 4′ high. The planks are nailed at each end to a 2″ x 4″ scantling 4′ long, which has two holes 1″

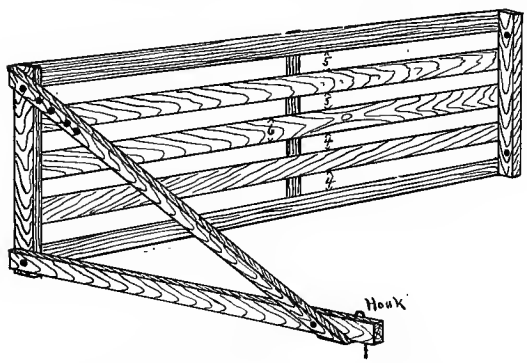


FIG. 255—PORTABLE HOG AND SHEEP FENCE.

in diameter for the purpose of putting the fence together, with a brace between the panels, as shown. In the center of each panel is a brace made of 4″ fencing. The main braces are made of the same; they are 6′ long; the top brace is bolted to the other at the ground. The extra holes in the upper brace are to regulate the position of the fence on a hillside. The braces may be put on either side; they are usually put both ways. Iron pins 18″ long, with an "f" hook at one end, are used by driving into the ground with the hook over the brace. Wooden pins are used to hold the fence together, running through the braces.

PORTABLE HOG FENCE.

For a portable hog fence the combination of wire and wood serves well; it is light, cheap and if good wood be used is durable. Timber should be used that will not warp or twist. Hemlock will serve and 1″ x 6″ stuff is heavy enough, though if it is to have much hard use 2″ x 6″ will be better. The illustration (Fig. 256) shows

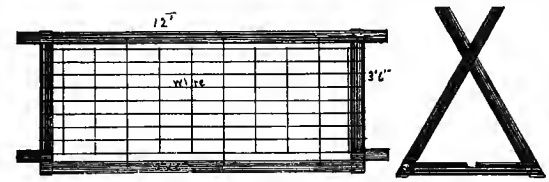


FIG. 256—PORTABLE HOG FENCE.

clearly how it is put together, with long nails clinching, or bolts. Wire fencing, cut into suitable lengths, leaving ends long enough to pass clear around the end pieces and tie, is used. Tie the wire also to the horizontal pieces at intervals. Except for special purposes it is better to buy woven wire hog fencing, stretch it about the land to be pastured off, support it by stakes and when through with it roll it up again and take it away.

ENGLISH HURDLES FOR SHEEP.

English hurdles for sheep are made so light that the shepherd can move them on his back. The drawing (Fig. 257) is of a good hurdle made

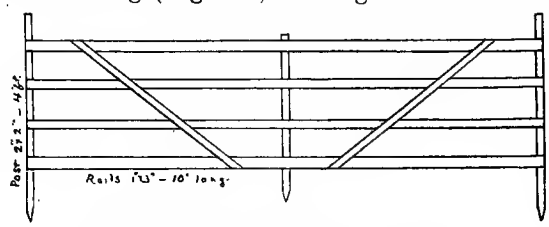


FIG. 257—ENGLISH HURDLE FOR SHEEP.

of hard wood 1½″ x 2″ 4′ long; sharpen one end; band the other end with a strip of hoop iron so it cannot split or wrap it a few turns tight with No. 12 wire; put on four bars of light

straight wood, pine is best; these bars are 1″ x 3″ and 10′ long. There must be a bar to make holes in the ground for inserting the posts, which then get a tap or two with the sledge to make them solid. A metal band slips over and holds the tops together. Heavy wire will serve or light wire for that matter.

BRACING A WIRE FENCE.

The general principle of bracing a wire fence is shown in Fig. 258. This brace is a rod of ¾″ iron, nutted and threaded at each end, passing through a 3′ length of 6″ x 6″ stuff. If the iron rod is not at hand a cable of six twisted wires

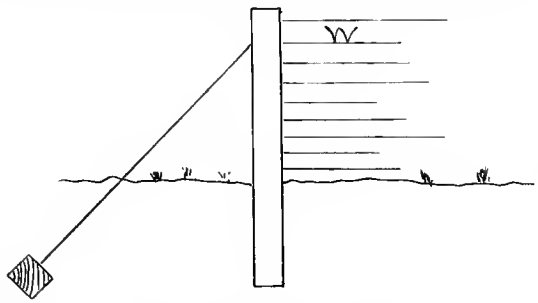


FIG. 258—BRACING A WIRE FENCE.

may be used. This brace is cheap—will hold the post down instead of pulling or pushing it up. It also is immovable and frost or wet does not affect it. It is not generally desirable, however, to have a brace extending out beyond the end of the fence. When it is not desirable to have such a brace the difficulty in obviated by the brace shown in Fig. 260. Take half of this illustration,

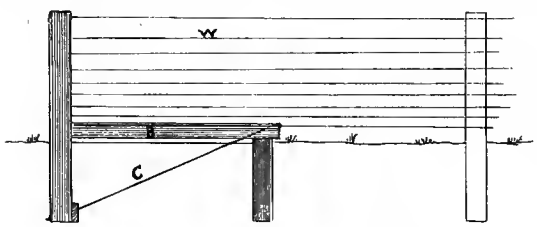


FIG. 259—BRACING A WIRE FENCE.

which shows a gateway in the line of fence, make the end of the wire cable, C, or rod, as the case may be, and make it fast to the "dead-man," D; this gives an end that will allow any strain without getting out of plumb or moving the post in the least. If a wire cable is used at C it is well to make it large and tightly twisted and short enough to make the posts B incline towards each other at the top a very little before the wire is strained, so that when all the slack is out they will be perpendicular. With an iron rod nutted at the upper end this is not necessary, for any obliquity can be remedied by a few turns with the wrench. When a gateway in the line of fence is required the plan shown in Fig. 260 has been found very satisfactory. The cable or rod passes under the block D, which should be a good durable stick of oak, 6″ x 6″ and about 4′ long. The fence will not lift it.

Fig. 259 illustrates the bracing of a post when it is desired that no brace should appear to view, as in the case of a lawn or yard fence. C is a rod of ¾″ iron passing through the lower end of the

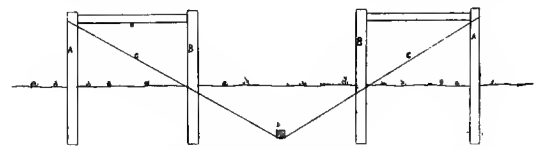


FIG. 260—BRACING A WIRE FENCE.

post and the end of the brace, B. There is also a block of 2″ x 6″ on the front of the end of the post to keep it from moving forward or lifting up. The short post is not fastened to the brace, which merely rests on it. Braced in this manner the post will remain perpendicular unless strain is brought on it sufficient to bend it. It should be of 8″ x 6″ stuff. The brace B should be of 6″ x 6″ stuff and about 6′ long.

A GOOD CHEAP FENCE.

L. N. Bonham of Ohio, a few years ago contributed the subjoined article to THE BREEDER'S GAZETTE: I have completed 110 rods of wire fence that has every appearance of giving good service. We have in the township more than 40 varieties of wire and wood fences, but few of them combine cheapness and efficiency enough to commend them. The farm was originally refenced with good locust posts and the best pine fencing for the majority of road and field fences. I used the old fence material found on the farm for slat fences, which have done good service, as some of them are good yet and will last several years longer.

I have always claimed that the well-made fence is the most economical. The wire fence I describe replaces a division fence that was built from the second grade of lumber and posts. I bought lumber and posts by the carload and as I hauled the lumber and posts to the farm I sorted each into three grades. This was on the theory that a fence, like a chain, is no stronger than its weakest link.

It does not pay to put sappy or cross-knotted boards into the same panel with strong, sound lumber. The lines of fence built with the three different grades of posts and boards are lasting in proportion to the quality of material used. The fence made of third-grade boards and posts had to be repaired several years ago and was later

removed. I am now replacing division fences. I hope the wire fence will last as long as did my third-grade pine and locust fence. The posts I have used in the wire fence are made from old locust trees which the borers had damaged, so the posts are not first-class and would not do for a board fence, even if I could get as good fencing as I purchased 25 years ago.

The new fence has a post every rod set 36″ in the ground. There are 10 strands of No. 10 galvanized wire, each double and twisted into a cable as the fence is made. For stays between the posts I have a crimped No. 9 wire that is put in every 15″ as the weaving progresses, and these stays are gripped by the cable so firmly that neither cables nor stays can be displaced without force enough to break one or both. The fence is hog-tight and bull strong. In the line of 110 rods I have three anchor posts 9′ long (butt cuts of whiteoak) squared to 12″ above ground. They are set 4′ in the ground and braced and anchored

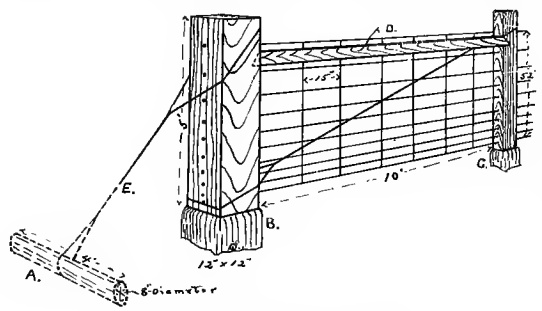


FIG. 261—A GOOD CHEAP FENCE.

as shown in Fig. 261. A is an oak timber buried horizontally 3′ under ground and at right angles with the fence. Around the middle of this "dead man" are four strands of No. 9 galvanized wire E that pass around the anchor post B and are twisted into a cable. Another cable of the same size and material passes around anchor post B near the ground and post C near the top. After the brace is put in place this cable is twisted tight enough to hold the second post firmly against it. Each end of the line of fence has the same arrangement of anchor posts, braces and cables, and in the middle of the line (55 rods from each end) is another anchor post similarly braced, except the cable is attached to an extra strong fence post instead of a "dead man."

The anchor posts are painted with oil and mineral paint and the tops covered with tin painted on both sides. The wires pass through the center of the anchor posts to ratchets. I think the twisted strands of wire will be less affected by changes of temperature than plain wire. I had the fence built in hot weather in preference to freezing or cold weather, as my experience is that wire and slat or paling fences keep in place better when put together in dry, hot weather than when built early in the spring or late in the fall.

I see many failures in wire fences from lack of well-constructed anchor posts and stays and from placing the posts too far apart and not deep enough. The most common form of bracing is to set one end of the brace near the top of the anchor post and at the foot of the next post in the line, and it is no uncommon sight to see the anchor post rise enough during the first winter to ruin the fence. I can no longer afford board fences. Wire fences have many objections, but their cheapness, neatness as well as ease of construction and keeping clean commend them. Before setting this fence I plowed a head land 10′ wide, harrowed it well and sowed grass and clover seed. Such a fencerow is free from weeds, furnishes good pasture and gives increased height and better drainage to the fence.

FARM GATES.

Every fence must have its gate. Where gates are opened and shut several times every day it is very important that the gate move easily and quickly. There are two gates that are in common use. The first is the common board gate which slides part way open on two wooden pegs before it swings. The second is the hinge gate. The first has the advantage of being easier on the posts. There is also an iron gate manufactured on the same principles, but instead of sliding it is provided with rollers. The hinge gate is quickly and easily swung. The greatest trouble is in keeping the gate posts in position so that the end of the gate will not drag. If the ground is not firm the post hole should be tamped full of small rocks against the back side of the post at the bottom of the hole and another at the top on the front side.

A still better way is to set a permanent gate post in cement. Gates are sometimes hung so that the top hinge is set back about 2″ so as to raise the gate as it swings open. If the swinging end of the gate is set on a block when the gate is open or shut, the strain on the gate post will be greatly relieved. The board gate of course is the cheapest.

Of the iron gates the prices on 14′ gates are from $8 to $9, according to height. There are several forms of patent opening gates on the market costing more. Some of them are quite satisfactory, though none of them meets all the requirements.

There is nothing on the farm that adds more to the appearance of the place than a good fence. There may be some choice as to the kind of fence one would want to use but there is no choice

as to the way it should be built. Every fence should be carefully built; it will last longer and increase actual value of the farm. The late Jeremiah M. Rusk said: "Show me the farmer's fences and I will tell you the kind of farmer he is."

This gate (Fig. 262) is horse-high, bull-strong and pig-tight, besides being light and easily opened and closed. It swings both ways, hangs on common iron hinges and an iron cable fastened from the outermost end to the swinging post. This cable may be tightened as the gate sags by means of a turn buckle. When the gate is closed

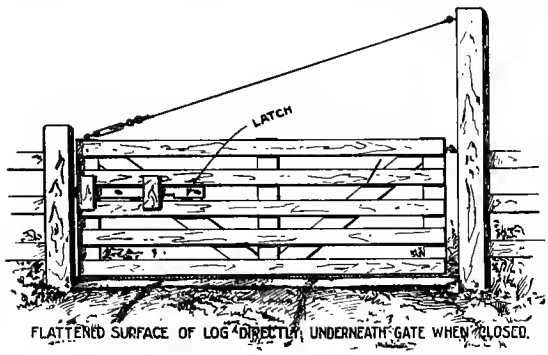


FIG. 262—FARM GATE.

it stands 2″ above a sill; the sill is made by imbedding a log, flattened on the upper-side, directly underneath the gate. The imbedded log is not level with the surrounding ground but is raised several inches and the ground leveled off to a gentle slope so as to make the approach to the sill gradual. This makes the gate swing more than half a foot above the ground when opening or closing and it can clearly be seen that this would help considerably to make easy the use of the gate during heavy snows. The latch is simply

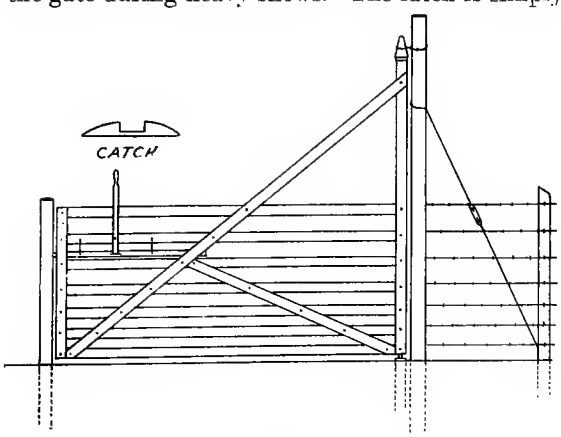


FIG. 263.

a sliding 4″ stick with notches cut in it so as to keep the latch in place when open or closed.

Fig. 263 shows a farm gate that is hung to swing clear in and out and is constructed of the best yellow pine or hard wood. The advantage claimed for it is that it swings clear either in or out, is easily opened by one on horseback from either side, is self-fastening and does not sag. The materials necessary in construction include one post 8″ x 8″ and 15′ long; one post 6″ x 6″ and 8′ long; one piece 4″ x 4″ and 10′ long, main standard; seven pieces 1″ x 4″ and 14′ long, hori-

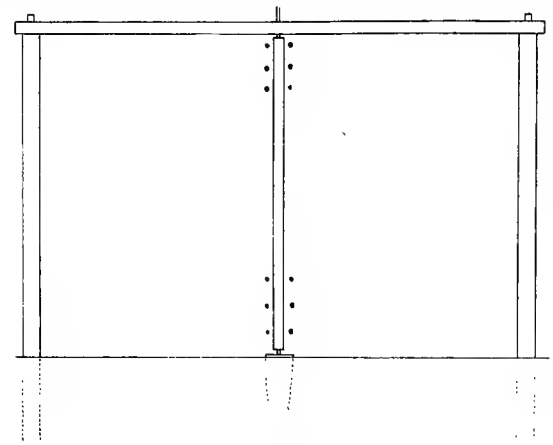


FIG. 264.

zontal strips; two pieces 1″ x 3″ and 17′ long, braces; two pieces 1″ x 4″ and 6′ long, end standards; one piece 1″ x 3″ and 4′ long, latch; one piece 1″ x 2″ and 3½′ long, handle bar; one piece of ½″ galvanized rod 3′ long; three pounds 10-penny wire nails and 20′ of wire for another brace.

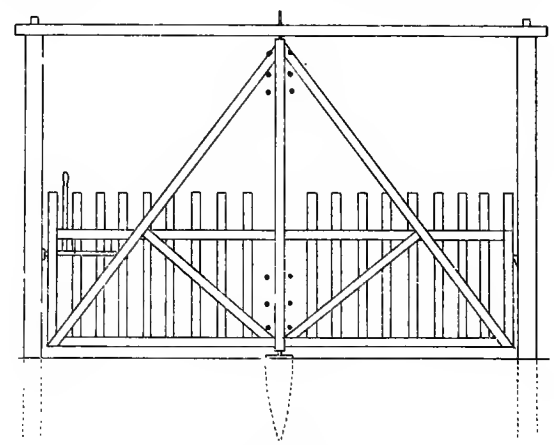


FIG. 265.

The latch is hung with No. 24 copper wire, swings clear and has no friction. The lower end of the handle bar passes through a staple 4″ wide driven through the latch. The catch is made of 2″ x 3″ hard wood 8″ long and is gained in flush

on post. The gate rests on a 6″ x 6″ block set 2′ in the ground. Fit the thimble skein over the top of the main standard, bend ½″ rod as shown and staple to the post. In the bottom of the standard insert an iron pin 4″ long to fit in a hole in the bottom block.

A gate that gives general satisfaction is constructed as follows: Set two posts 20′ apart, take a piece of strong timber 20′ long, mortise and tenon down on top of the posts and bore a 2″ hole in the center of the cross-piece. The gate posts should be high enough to allow a load of hay to pass under this cross-piece without the latter dragging off the driver; take two pieces of iron 2′ or 3′ long, an old wagon tire will do, drill three holes in each piece large enough to receive a ⅝″ bolt, hammer one end of one piece round to go through the 2″ hole in the cross-piece overhead and hammer one end of the other piece of iron to an abrupt bevel to fit into an iron socket near the ground, which is the axis or pivot upon which the gate is to turn. Take two 2″ x 4″ scantlings, bore three holes in each end of each one to match the holes in the irons, put the irons between the scantlings and bolt securely; leave enough of the iron projecting to go through the hole in the cross-piece, as shown in Fig. 265, and enough projecting at the other end to go into the socket near the ground. We now have up the two gate posts, the cross-girder and upright pivotal piece upon which the gate is to turn. (Fig. 264.) The gate may be built to suit one's personal taste. When completed there are two gates or two driveways 10′ wide when the gate is open, so that two teams may pass through the gate at the same time.

Fig. 265 shows the gate closed. In the frame work 2″ x 4″s are used and the upright or picket pieces are 1″ x 4″; the latch is 3′ long made of an old buggy tire fastened to the gate at the distal end with a loose bolt, having a hole in it 6″ from the end next to the gate post; one end of a small rope is passed through the hole in the latch and the other end of the rope through a hole in the lower end of the lever and a latch receiver on each post beveled on both sides makes it a self-latcher when the gate is opened from either side or turned round and round either way; it will latch every time the latch comes to either post. One can ride up to the gate, pull down the lever, push the gate open, ride through, swing his horse half round and close the gate behind or push it forward until the latch catches in the receiver at the opposite post.

The post for a farm gate is an all-important thing. A good, strong, immovable post helps to keep the gate in shape. Where practicable, permanent posts of cement are recommended, with 3′ below the surface. As to the gate shown in Fig. 266, an iron runs through the post 6″ from the ground and another 4′ above this. These rods project far enough from the posts with bolt holes through the ends to form butts for hinges on one side and on the other to screw on a piece of timber, to which the fence is attached. This gives a permanent and immovable post, both for gate and fence. The posts have square sockets in the upper end, in which can be inserted wooden posts to construct an arch over the gate if so desired. The posts are not less than 15′ apart on the inside and are connected by a beam overhead 8′ from the ground.

The gate is not less than 15′ wide, and, instead of being hung on hinges in the ordinary way, it revolves on a center post. This gives two spaces 7½′ wide when the gate is open, amply wide for all ordinary farm purposes. The gate being light can easily be lifted out of its holdings for heavy machinery and wagons of hay to pass. The upper beam can also be removed for the higher loads. The gate itself is thus constructed: Four slats 16′ long, 1″ thick and 4″ wide; two pieces of scantling 4′ long, 4″ wide and 2″ thick. For a 15′ gate saw one foot off two of the slats and bolt them on the ends of the scantling with 4″ bolts running down into the

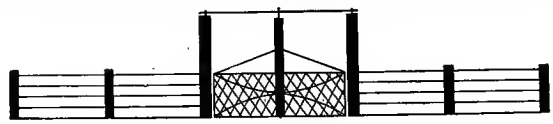


FIG. 266.

stile. The other two slats are used as bent braces in such a way as to form two arches bolted together in the middle. Weave the wire of No. 9 and No. 15 and while it is still tight nail it fast to the frame work. This makes a light, strong gate through which no pig can squeeze and which will defy larger stock.

The frame work is made fast to the revolving post with three bolts with hooked ends. These are put under the top and bottom slats and the center of the brace boards, going entirely through the revolving post. This post has an iron spur at each end and a good ring fitted over the end to keep it from splitting out. The bottom spur is 1½″ long and the top one 3″. The bottom revolves on a cedar or locust post in the ground flush with the surface, and the top one in a hole in the cross beam. The top one is long enough to allow the bottom to be lifted out of socket when necessary. The weight of the gate will keep it in place.

To keep the gate from sagging put wooden braces from each end up to the center post or twist in a doubled No. 9 wire, which perhaps is

better. In this way are secured two short, strong gates in one that can not possibly sag. There are no hinges to be getting out of order. Use lag bolts freely of various sizes. When used for spurs to the revolving post, screw them up as close as required and then cut off the heads. This gives a good tight pin.

The gate can be constructed at a cost for materials of about $1. It can be built by anyone who is handy with tools for less than that amount. When the gate is put in place it looks neat and gives good satisfaction.

The gate illustrated in Fig. 267 is 5′ high and 11′ wide. It requires eight 16′ boards. Hard pine, dressed on two sides and 5″ wide has given satisfaction. A child can open and close it. Properly put up and with posts braced there is no sag or twisting out of shape. One of these gates made from rough pine fencing has been swinging eighteen years and is still good, and has been opened and closed as often as 20 times daily.

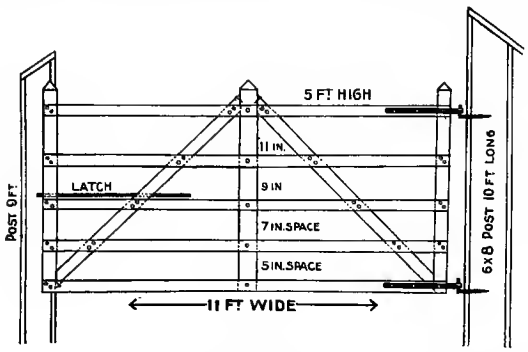


FIG 267.

The latch is placed in the gate between the brace boards, which are double, one on each side of gate, as also are the end and center pieces. Use two bolts in each board as shown in the cut. It holds the gate in place better than when one bolt is used. Forty-eight 3½″x⅜″ bolts are required. The cost is about $6 for painting, building and lumber.

The type of gate shown in Fig. 268 for pastures and fields may be 12′ to 14′ by 4½′ high.

Make a frame of five pieces, two 2″x4″ and one 2″ x 6″, as shown in illustration. Cut as many pieces of No. 9 wire as are desired about 2′ longer than twice the length of the gate; fasten the ends of the wire to 2″x6″ after passing around the out end. Creases should be cut in the 2″x4″ and 2″x6″ pieces just deep enough to imbed the wire. The wires being in place, nail two 1″x12″ pieces 5½′ long, one on each side of the 2″x6″ end piece, forming a strong gate head to which to attach hinges; the 18″ extending above the top of the gate, receiving one end of the brace or supporting wire, as seen in Fig. 268, makes the support more effectual. Over the 2″x 4s″ at the opposite end I nail a 1″x6″. Next twist the wires evenly until all are drawn tight, but not too tight, else they will warp the frame.

To prevent stock from rubbing against the gate some farmers use barbed wire in place of No. 9 smooth just above the center and sometimes put on cross wires, doubling them and

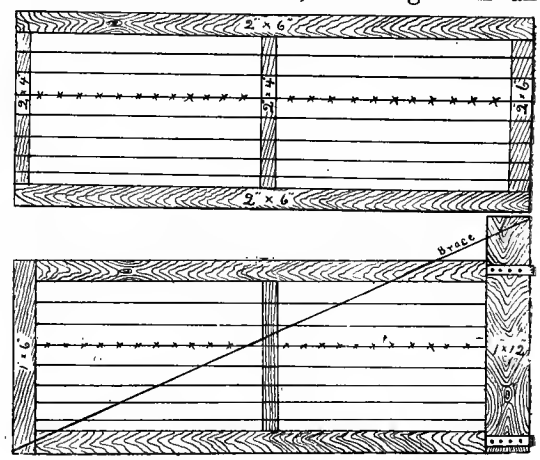


FIG. 268.

twisting between the horizontal wires, thus holding the latter in place and preventing pigs from squeezing through. The number of horizontal wires used will depend on the kind of stock fenced against. The brace or supporting wire is last put on and should be twisted till it holds the outer end of gate at its proper position. If the gate sags at any time one or two twists will bring it up. This is a strong, neat gate that any one can make, and if the parts of the wood that will not be accessible after the gate is finished are well painted or coated with hot tar before putting together and all exposed parts kept well painted afterward it will be a gate for a lifetime.

The drawing (Fig. 269) shows a farm gate 10½′ long and 5′ high. The material used may be 1″x4″ hard pine or oak, dressed on both sides. Paint the pieces before putting the gate together. Use five upright pieces, two at each end and one in the middle. On the side with the middle piece use two short braces and on the other side a long brace. If this is done the gate will never sag. Use as many boards in this gate as desired. The fewer boards the lighter the gate will be and the less the wind will catch it. Use No. 9 wire. Wrap each end around the head of the gate, running it back to the heel, where it is cut off and fastened to a ⅜″ bolt, which has had the head part bent into the shape of a hook B in the

illustration. Run the bolt through the two upright pieces at the heel of the gate. Tightening up the nuts on the bolts will stretch the wires. Staple each wire to each piece of wood that it crosses. Do not drive the staples in tight.

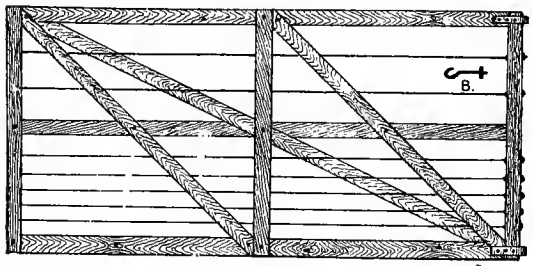


FIG. 269.

The most important thing is the hanging of the gate. Many farmers contend that all gates should be made to open both ways. This will save many runaways besides being much more convenient. Use strap and screw hinges. When boring holes in the gate post for the screws begin on the corner of the post and bore toward the opposite corner. Fasten the hinges on the side of the gate that will permit of it being opened both ways.

The plan of a gate that can be instantly adjusted to any height to swing over snowdrifts or set high enough to allow sheep or pigs to pass beneath it and restrain cattle or horses is indicated in the drawing.

This gate may be made of light, stiff material, good pine being commonly employed. The planks may be $1\frac{1}{4}''$x4″, and any length up to 12′. It is all put together with $\frac{3}{8}''$ carriage bolts. Fig. 270 shows the gate with holes bored and

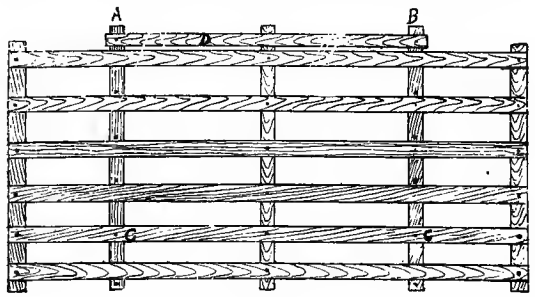


FIG. 270.

half the upright pieces in place. It will be noted that the braces A B are bolted through the rail next the bottom at C, and the other bolts merely pass through the braces either above or below the rails, as shown in the drawing. The connecting pieces D must be just $\frac{3}{4}''$ above the top rail when the braces are vertical, as in Fig. 270.

Fig. 271 shows the gate completed and the braces pushed back to hold it square. These braces must be put on loosely enough so that

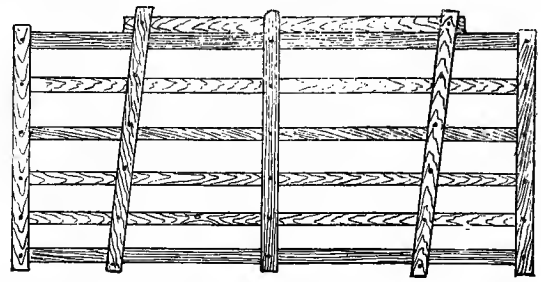


FIG 271.

they will work easily back and forward, and washers should be put between the braces and rail at C.

Fig. 272 shows how the gate is raised up and the braces pushed back to hold it to allow pigs to run under it. It may be raised much higher than this if desired. By pulling the brace for-

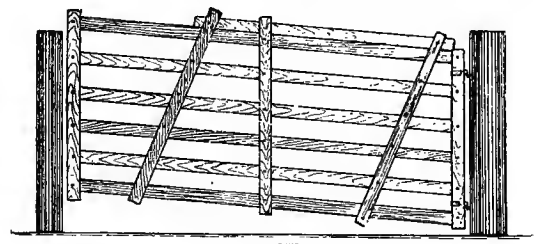


FIG. 272.

ward the end of the gate drops to the ground and this serves to keep it open when desired. The hinges are common strap and screw hinges, the strap bent around as shown in Fig. 272 and bolted to the vertical pieces.

To make the gate represented by Fig. 273 requires eight 6″ pine fencing boards 16′ long.

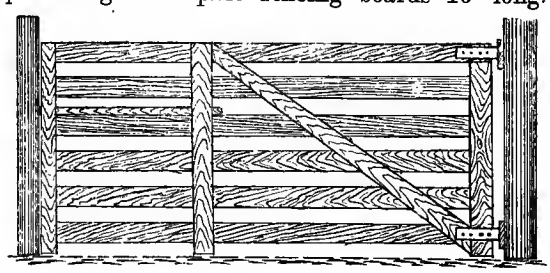


FIG. 273.

Plane them smooth on both sides. From six of the boards cut $5\frac{1}{2}'$, leaving them $10\frac{1}{2}'$ in length for the bars of the gate. Take two of the $5\frac{1}{2}'$ pieces and use for battens for the back. Rip 2″

off two others and place them 3½′ from the front of the gate, one on each side of the bars. Take another of these boards, rip it into two 3″ strips and use for battens for the front part. Take the two remaining boards, cut them the proper length to reach from the bottom of the battens at the back to the top of the battens which are placed 3½′ from the front. Rip enough off one side of these boards to make them 4″ wide at the top, leaving them 6″ wide at the bottom. To make this gate use ⅜″ bolts, placing a washer under each nut. In hanging it the 12″ hook and strap hinges are the most satisfactory. Place the latch just above the third bar from the top. This makes it easy to be opened on horseback. This is a neat, strong and substantial gate, and can be built with but little waste of lumber. If kept well painted it will last many years. In buying lumber make it a practice to select enough good straight boards to keep material on hand to make the necessary gates for the farm.

Fig. 274 shows a gate that has been used constantly for the last 30 years. Probably the best material out of which to make it is seasoned

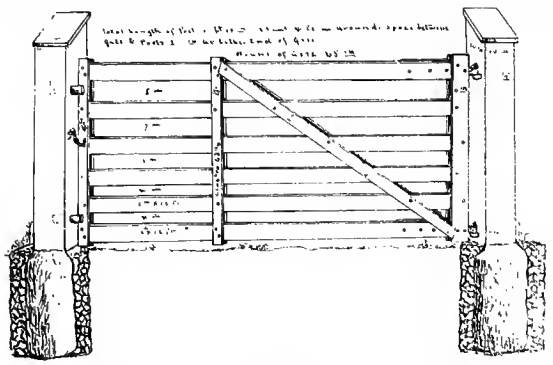


FIG. 274.

white oak or black walnut. Use fencing boards 1″ thick, 6″ wide and 12′ long, and for an ordinary gate five planks high is enough. Bolt the gate together with ¼″ bolts and washers; leave the upright boards where the hinges are fastened 6″ wide and the other uprights and braces 3″ wide, which is strong enough and much lighter. Let the braces into the uprights top and bottom ¼″ The posts should be 10′ long for a five-plank gate. Cut the tops slanting like a roof and nail on a short board for top. The bottom of the posts should go into the ground 4′ deep in a hole made large enough to contain a yard of small broken stone or bats well rammed in from bottom to top mixed with the dirt or clay. Set the posts 12′4″ apart, 2″ at each end of the gate space. Set the gate 4″ off the ground, level on top, and leave 2″ at the top so as to make it open upward and hang shut when not fastened. Make the hinges of heavy wagon-tire iron, four ⅜″ bolts to each.

Fig. 274A shows a gate that is made of common fence boards generally 16′ long fastened together with wire nails clinched, then hung on a cleat between two posts set close together. One of the posts should reach up about 2′ above the gate with pivot for the lever to turn on. No matter

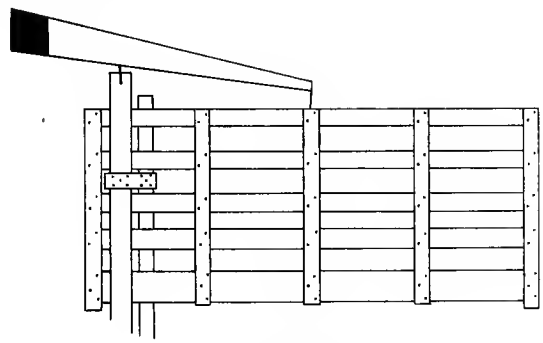


FIG. 274A.

what the heft of the gate is when finished the lever can be weighted until a small child can open or shut the gate with ease. This gate swings only one way.

Fig. 275 shows a gate that never sags. When made of walnut or any other hard wood and bolted together it will last indefinitely. Gates of this type put up ten years ago and made of black walnut 1″x4″ are good today and swing

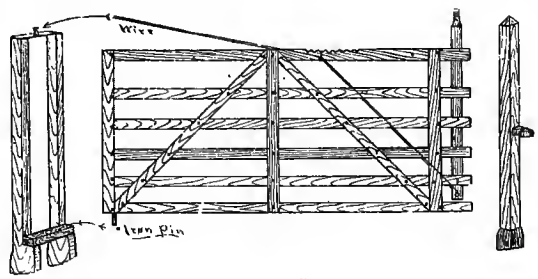


FIG. 275.

clear of the ground. A post to which to latch the gate when open will be found convenient, for when properly hung the gate will not stand open unless held.

The art of hanging a farm gate is not generally understood, and this is the reason why so many gates have their "noses" in the ground. It is useless to say that the hanging post must be well secured, for if a man does not care enough about the working of his gate to secure

the post, a gate with its nose in the ground is good enough for him.

Fig. 276 shows a gate braced, hung and latched as a Virginia farmer has been successfully using it for 25 years. A gate hung and latched like this is easily opened on horseback and one need not look back to see if it is going to latch. At N are notches 2½″ or 3″ apart in the top slat for a bolt in the top of the braces to rest in; this allows the gate to be adjusted as desired. At I is a safe-pin to prevent hogs from raising the

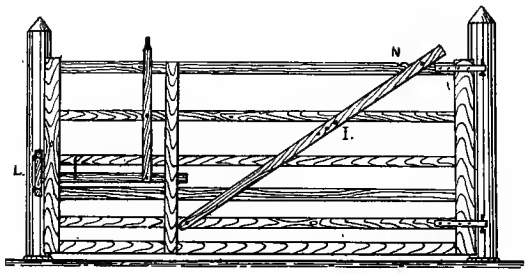


FIG. 276.

gate. At L two strong pins are put in the post with a 1½″ or 2″ auger, with a 1″x8″x15″ board nailed on as shown, with the side next to the gate dressed. The inner edge of the board is about 1″ from the gate and just far enough from the post for the latch to pass behind it freely; the outer edge of the board should be at such an angle from the gate as will cause the latch to strike it near the outer edge; this causes the latch to swing back and glide in easily.

Fig. 277 explains how the gate is hung to insure self-shutting. The posts are leaned from the gate about 3″; this causes the gate to rise as it is opened and to descend as it is shut. The gate comes down to the proper place when shut. To make this plan of hanging plain, if the gate

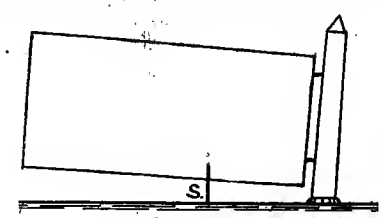


FIG. 277.

stands east and west when shut and points south when open the posts should lean north; the more they lean the higher the gate will rise when open and the more heft it will have on going shut. Posts should stand plumb east and west. To obtain the same result in hanging gates to trees or posts already set which are plumb the bottom hook in the post should extend about 3″ further from the post than the top one. Hooks must be put in side of the post as in Fig. 276. At S, in Fig. 277 is the stake behind to prevent the gate from opening around further than is necessary. The second and top slats should not be less than 1″x6″, the braces 1″x4″. On several gates illustrated in this book the bottom hinge is shown to be on the bottom slat. This will cause it to rot loose quicker than if it were higher. In several instances the braces are shown to extend to the bottom, which will cause them to give way earlier from decay.

Fig. 278 shows how by placing a stick of timber a little below the surface of the ground solidly from one post to the other the gate is prevented from sagging down with the weight of the outer end and the post must keep its upright position.

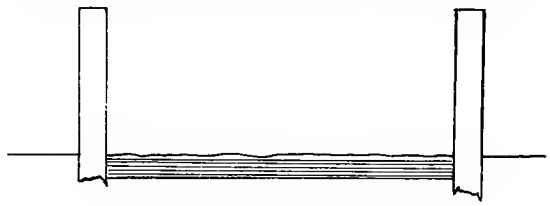


FIG. 278.

It is not necessary that the sleeper should reach clear to the second post, although it is better. The earth will hold it if it is 6′ long. At right angles to this sleeper put another in the direction that the gate is to open and the post will never sag in that direction either.

Fig. 279 shows a good strong gate that may be very quickly nailed together and it is rigid and retains its shape well with age and hard usage. The two short braces make a better and

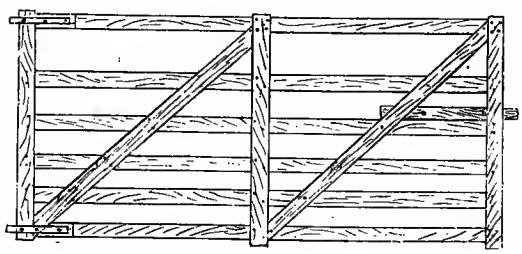


FIG. 279.

stiffer gate than one long one would. Good pine, 1″x4″, will answer for this gate, and about 12-penny nails to put it together so that they may clinch well will serve as well as bolts.

Fig. 280 shows a gate with a wire brace. When there is much snow to obstruct gates it is sometimes desirable to raise them high enough to allow them to swing over the drifts. The wire looping around the gate and not fastened except

at the upper corner may be slipped down as the gate is raised to hold the outer end at any angle. The wire brace ought not to come so low when the gate is square as drawn; when slipped down

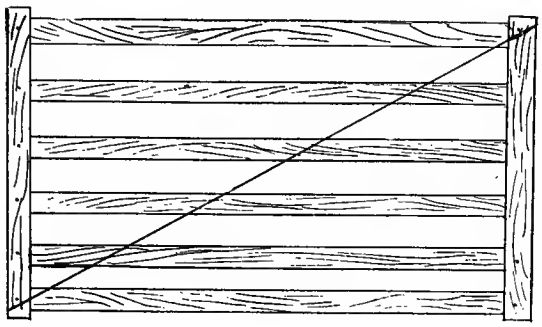


FIG. 280.

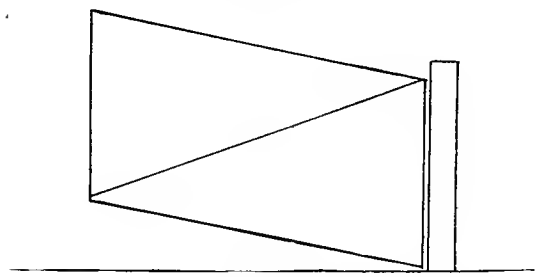


FIG. 281.

to position shown the gate should be in the same shape as Fig. 281. This gate must be bolted together, one bolt at each intersection.

Fig. 282 shows a very strong and durable gate, neat-looking and adapted to use along roadsides where a neat gate is desirable. It is not expensive to construct. The frame is of good pine, 2″x4″, except the heel post, which is 4″x4″. On

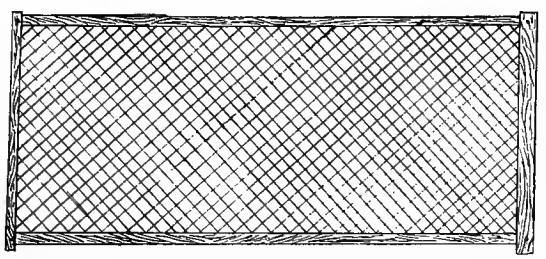


FIG. 282.

this frame, which is mortised together, is stretched and stapled some sort of woven wire fencing that will not be injured by hard usage. There are a number of varieties of wire fencing that may be made right on the frame as wanted. Large, strong hinges with screw bolts to go into the post a good distance are advised for any kind of gate.

Fig. 283 illustrates a form of gate that is in extensive use in many localities. It is a 12′ gate. From upright A to upright B is 8′ and from upright B to C is 4′. The cut also shows a form of home-made spring latch which will be found very useful, especially when one wants to open

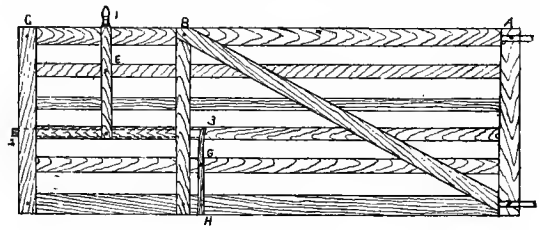


FIG. 283.

the gate from on horseback. 1, of course, is the latch handle working on a bolt at E; 2 is the latch proper; 3 is the latch spring fastened at H and G with the upper end bolted to the end of the latch.

The gate illustrated in Fig. 284 is made of 3″ strips 1¼″ at one end and ¾″ at the other. A is made of 12″ plank 1″ thick. The strips are nailed onto A. The ordinary hinge is used. The top hinge is on one side and the bottom hinge on the other side. The gate is hung plumb. The

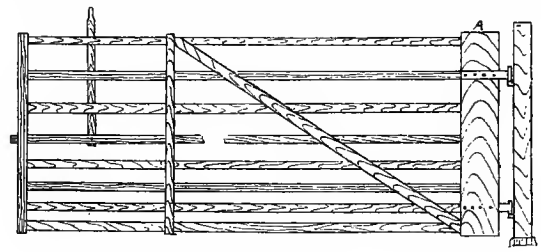


FIG. 284.

bottom hinge must be put on the side where the gate is to open. Make the gate, put on the hinges and then plumb it. Mark where to bore holes in the post while the gate is standing propped up against the post. Any one can make and hang such a gate.

A type of gate used a great deal in the South

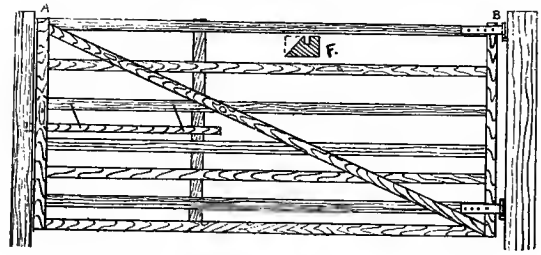


FIG. 285.

and shown in Fig. 285 usually is made of oak timber and lasts remarkably well. It is light and strong. The post A is set 3′ in the ground. F shows a section of the post where the latch strikes it. The latch slips into the mortise after it is pushed back by sliding on the bevel. The post B is set 4′ in ground. The latch is suspended by two pieces of No. 10 wire and the whole gate is made of 1″x3″ oak strips. Nos. 8 and 10 wire nails clinched across the grain may be used. They hold as well as bolts.

A Tennessee farm gate is presented in Fig. 286. It is light, cheap and durable. It can be made as tall or as low as may be desired by using

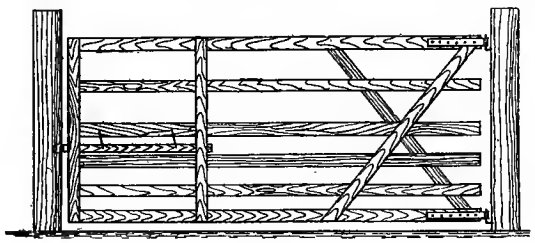


FIG. 286.

many or few horizontal bars. The drawing shows six bars which cut 1″x4″ and properly spaced make the gate just 5′ high.

The Minnesota farm gate shown in Fig. 287 will stand a good deal of rough usage. It is made of four 2″x6″ planks (hard pine preferred), 6″ apart, making it 42″ in width, and

or else on the side of a barn or shed by bolts or nails. The top length of the gate is 20′; bottom length 16′ 6″; height from ground 48″. It is an easy gate to open.

An Ohio farmer gives his views as follows on farm gates: We have just finished overhauling our gates which have had for ten years the rough handling of tenants. We find the gates hung with hinges made by our blacksmith with straps 2′ long and hooks long enough to go through the posts and with screw taps on the end all swing clear, although made and hung many years ago. On the other hand all gates hung with straps and hooks that screw into the posts 5″ to 6″ are loose and gates sagged and several of the hooks are out and lost. The latter straps and screw-hooks with bolts are furnished at hardware stores. They do well for a few years, but are not as cheap in the long run nor as satisfactory as the heavier blacksmith-made hinges. The latter are seldom used now by farmers. The ready-made hinges are neat and handy, but fail to give satisfactory service as a rule.

We have three styles of gates. The cheapest is placed where not often used and not along the highway or near the houses and barns. Our common slide gate is made 12′ long and 4′ high. We use pine fencing boards 6″ wide and 12′ long, of good quality, free from coarse knots. Six boards are required for a gate five boards high. The spaces between boards, beginning at the top, are 9″, 7″ 5″ and 3″ respectively. The sixth board, cut into three pieces 4′ long, makes the

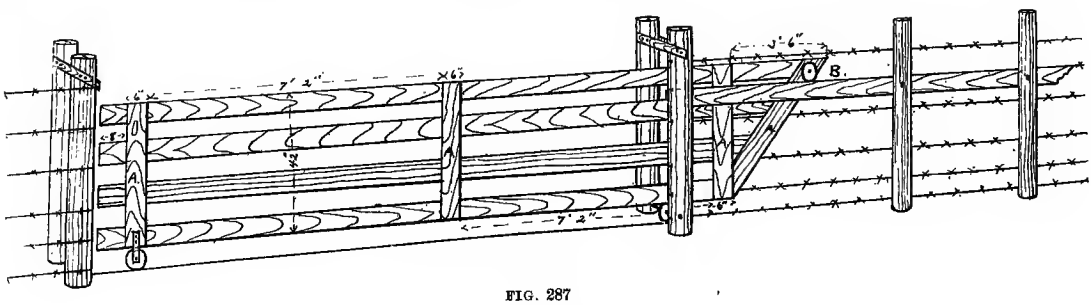


FIG. 287

four 1″x6″ cross pieces. All are nailed together, and also bolted by 5″x⅜″ bolts except the rear-end groove wheel, which is fastened on by a 6″x½″ bolt. A 6″ pulley can be used for the groove wheel. The front bottom wheel is a 6″ band wheel taken from any old machine. It is bolted to the gate with strap-iron by 6″x½″ bolts. The cross pieces are on both sides of the planks. At the bottom of two rear posts is a roller for the gate to slide or roll in between. The upper rear groove wheel B rolls on a beaded 2″x6″ plank which can be fastened on the wire or board fence,

battens. One end batten is set back 6″ from the end of the gate; the other is set flush with the end, and the third batten is in the middle of the gate. The gate is put together with eight-penny wire nails, clinched. We set two posts with sides 1½″ apart to receive the end of the gate up to the batten. We next set a post 15″ in from the other end of the gate and another on the side to which the gate is to open and nearer to the end of the gate, so as to allow the gate to come around at right angles to the line of the fence. The gate is to be supported on two cross strips nailed to

the two posts. The upper strips should be 6″ wide, coming under the top board, and the lower strip 3″ wide, coming under the second board from the bottom, so that the gate is 3″ from the ground. Two strips of the same kind should be put on the other posts, so as to carry the gate in line with the fence. If these bottom strips are 3″ wide, scant, they will fill the bottom space at each end of the gate and prevent hogs from lifting it. If now a 1″ hole is bored in the third board of the gate so a pin can pass through it and between the two heel posts the gate cannot be moved out of place until the pin is removed.

This kind of a slip gate is very convenient for division fences where there is not frequent passing through. The posts used with this gate need not be heavy. We find round posts, too light for board fence, do admirably if straight enough. The gate will last longer if the posts are set as directed and there is only space enough between the posts to allow the gate to pass freely and not have much play when closed. It is a cheap device, easily made, handier than bars or slip gaps and will last 10 to 15 years with reasonable care. We have never seen a sliding gate that was equal to a hinged gate properly made and well hung. It is miserable economy to go to the expense for material for a gate and then neglect to put it together in a substantial manner, or to hang it with too light hinges to posts poorly set or too light to carry the gate.

We have several swinging gates that were made fifteen years ago and are good for several years to come. Occasionally we find one of these gates with a broken board or stem. It is but a small task to loosen the screw bolts and put in a new piece and the life of the gate is prolonged and it does its work satisfactorily. It is very poor economy to neglect the gates when they drag or are not in condition to turn stock. Neglect to keep gates in repair is even more expensive and dangerous than to neglect fences. Either entails loss to stock and induces bad habits that are troublesome and costly in the end. The swinging gates are 12′ long by 52″ high. This is 4″ higher than a common board or paling fence. It is better to have the gate higher than the fence, as stock will naturally try to get out at the gate before they will try the fence. The gate yields to the pressure more than the fence, and if a little higher than the fence the animals are less apt to reach over and press against it. To strengthen the top board we have a strip 3″x1″ nailed on the top. This stiffens the top board and covers the ends of the battens so the weather does not check the ends nor rot wood around the bolts.

The swing gates are made of 6″ fencing of good quality put together with bolts 3½″x⅜″, with washers under the tops. Ours are five boards high and the spaces between the boards beginning at the top are 8½″, 6″, 4½″ and 3″, respectively. The design is the same as shown in Fig. 288, having the one long brace from the lower corner of the end to which the hinges are attached to the upper end of an upright 4′ from the swinging end. It pays to make the joints of the brace neat and true and even to paint the ends of the brace and battens to prevent decay. The lumber should be fairly well seasoned and bolts well drawn up. There is little danger of getting the hinges too heavy, but much danger of getting them too light. We find that where the bolt nearest the hook is ⅜″ or less it breaks before any other part of the gate. The most of the hinges found in the stores take too small bolts. If the heel bolts hold and the hooks that screw into the post do not fail such a gate will last longer than the average fence. The gate is lighter if made with the brace and front battens 3″x1″, and we find they do not give out. The slide-latch is 3″x1″, sides planed to move freely. It enters a slot or mortise in the post. The mortise should be 5″ long and 2″ deep and a full inch wide to admit the latch freely, yet without much play. A handy man can make and hang this gate in less than half a day.

We have another style of gate for along the highway and near the barn, the grove, the carriage-house and other places where appearances count something. The illustration (Fig. 288)

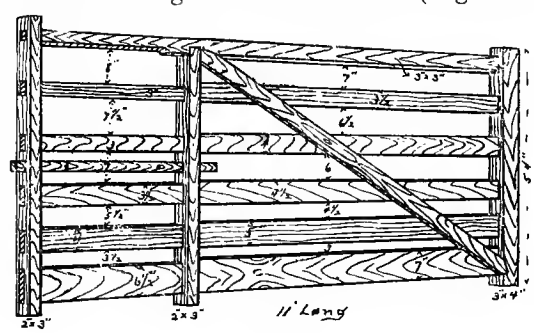


FIG. 288.

shows this gate. Gates of this style have been painted every four years and those on the highway and grove and near the carriage-house are sound and swing as clear as they did 25 years ago, and have not cost a cent for repairs except paint. The posts the gates are hung to are white-oak, 9′ long, butt cuts, squared to 10″ at the saw-mill half the length and left under cover a year to dry out and not crack. The posts were set 4′ in the ground and are all good for many years yet. The tops of the posts are painted and covered with tin painted on both sides. Such gates and posts are a solid comfort, and considering the service and satis-

faction given they are not more expensive than some of the cheaper sorts that have given their owners no satisfaction and been an endless annoyance. In the building of farm gates and fences that are to protect our crops and live stock and make life endurable and less of a burden it pays to build thoroughly well.

A GOOD LATCH FOR FARM GATES.

The latch shown in Figs. 289 and 290 is made of a piece of 1″ or ¾″ round iron with a thread cut on one end so that it may be screwed into the

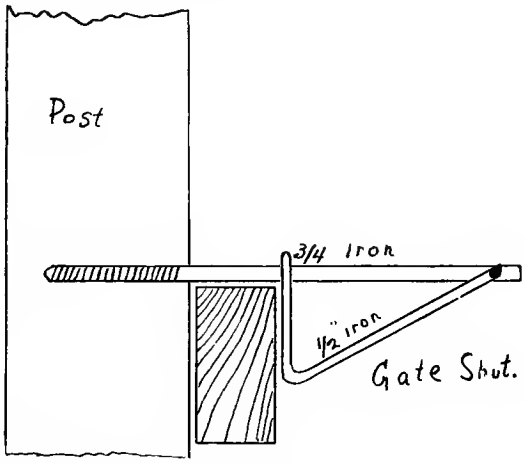


FIG. 289—A GOOD LATCH FOR FARM GATE.

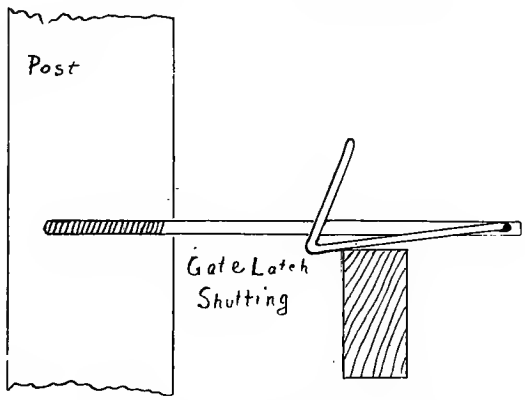


FIG. 290—A GOOD LATCH FOR FARM GATE.

post and a ⅝″ hole drilled through the other end in which is passed a piece of ½″ iron, or a little larger, which is welded into a ring and then bent into the shape shown in Fig. 289. This is screwed into the post and the wooden latch or one of the gate boards extends out to engage it on the under side. A little loop of wire about the raising part of the latch keeps it from flying clear over when struck hard by the gate, or a pin may be thrust through the stem of the latch. A blacksmith can make one of these latches in a quarter of an hour.

A FARM GATE HINGE.

The cut, Fig. 291, is of a hinge which, if applied, will keep a gate shut without a latch and permit it to swing either way. The gate must be short enough so as to swing past the post. When the gate is opened it will be farther from the ground at the swing end than at the post. When there is snow on the ground it will rise over it instead of pushing it back. No. 1 is the hinge part for the post; No. 2, hinge part for gate. The distance between the lugs (AA) is

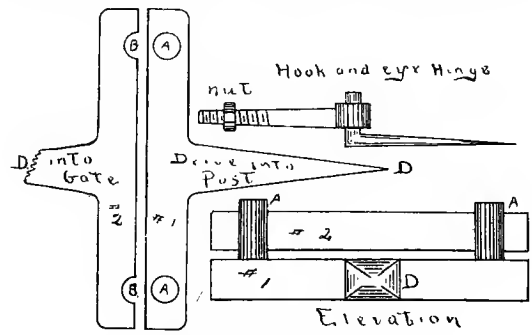


FIG. 291—A FARM GATE HINGE.

5″. The greater this distance the higher the end of the gate will rise as it opens. The shanks (DD) of hinge parts Nos. 1 and 2 are driven into the post and gate, respectively. When the gate is hung the sockets (BB) bear against the lugs (AA), one or the other of the lugs acting as the pivot, according to the direction in which the gate is opened. Fig. 291 gives the position of Nos. 1 and 2 when viewed from the post end, D being the shank which is driven into the post. A hook-and-eye hinge is used at the top of the gate. The nut on the shank of this hinge is used in adjusting the gate so as to hang level.

WAGON RACK AND STANCHION.

The plan illustrated in Figs. 292 and 293 is of a cattle and hog rack. As a cattle rack it will hold the most unruly and strongest cow or bull in such a position that it cannot do any damage to itself, the driver or the wagon. The dimensions are as follows: Use 1″ lumber for rack 3′ high and 12′ long; the top board is 9′ 8″ long, lower board 12′ long; there is a 6″ space between boards. The upright side pieces or slats are all made of hardwood. Slats A, B and D are 3″ wide; slat C 1″ wide; all double. Slat E is single, placed outside, 3″ wide, 2½′ long. Slat F is also single, placed inside, 2″ wide and 16″ long; this slat is to rest on top edge of wagon-box to hold front endgate when used as a hog rack.

Slats are spaced apart as given in Fig. 293. The cut-out board G, for placing on the wagon seat, is slid in between double-slat D and bolted to slats E and F. Nailed near the top on the inside of rack and in front of slat C is a hard-wood block (H) ½″ x 18″; it is used to prevent the stanchion from being pulled down backward.

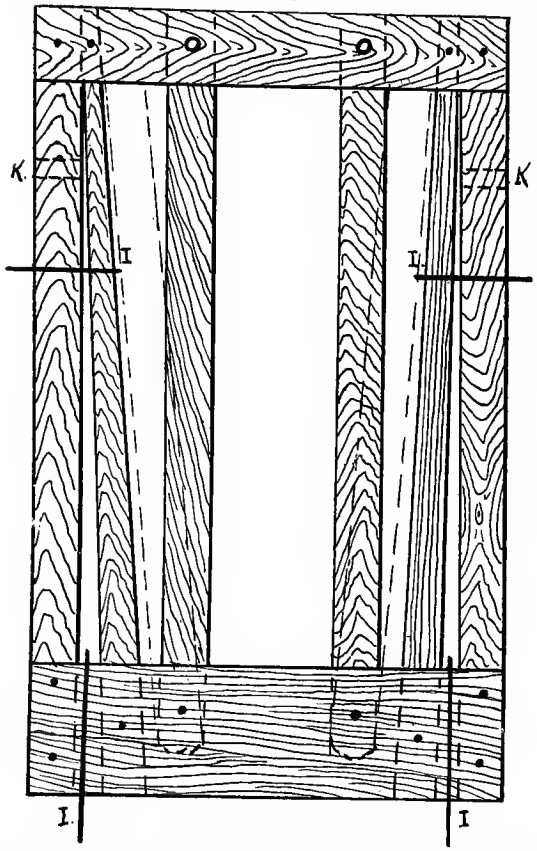


FIG. 292—WAGON RACK AND STANCHION (SHOWING STANCHION).

Ordinary endgates and end rods are used for the rack in either end.

The movable stanchion (Fig. 292) is made 5′ high and 3′ wide or inside width of wagon box. Cross-pieces at the top and bottom are double; bottom ones are of 10″ planks and top ones are of 6″ planks. The uprights are 2″ x 4″ The two middle uprights are movable sideways at the top to open the stanchion and are locked by sticking in ordinary iron pins between them. For hauling cattle after the rack is on the wagon place the stanchion crossways between the racks in the wagon-box in front of block H. Bolt it down with hook bolts (I), running the bolts through the bottom of the wagon-box and wagon-box crosspiece underneath. Next bolt it sideways onto the rack with hook bolts at J. Hook bolts are ½″ thick, 12″ long with 3″ hooks, threaded plentifully. To prevent the stanchion from being pushed down forward use two stout braces running upwards diagonally from the bottom of front end of wagon-box to front of stanchion against brace block at about point K (Fig. 292). For ugly and dangerous animals tie their heads downward, running the ropes through the bottom of the wagon-box.

A VIRGINIA HOGPEN FRONT.

The drawing (Fig. 294) is of a pig pen front. Posts are shown at each end, and constitute a part of the fence. A is 1″ x 6″ top-board of gate, and extends across posts. B B B are 1″ x 6″

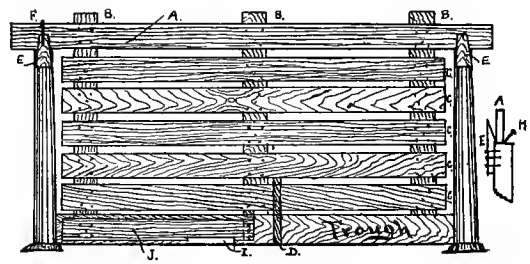


FIG. 294—A VIRGINIA HOGPEN FRONT.

uprights and should be on the inside. C C C C C are 1″ x 6″. D is a small prop to hold the gate back while feed is put in. E is a 1″ x 2″ cleat nailed on front of post to keep A in place, cut with slope on back side as shown at E, so that A may have free play when the gate is pushed back. F at left top is a strip of steel roofing nailed down to posts and across A to keep pigs from

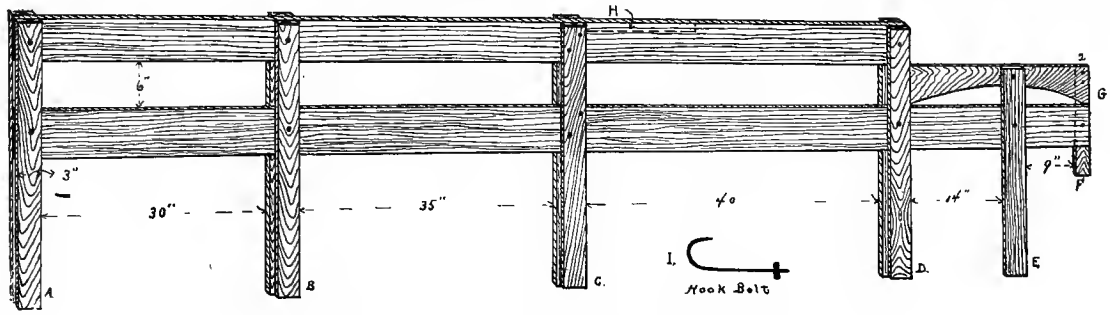


FIG. 293—WAGON RACK AND STANCHION (SHOWING RACK).

hoisting the gate. H is a spike driven in the post behind A to keep the gate in place. I shows a section of a board which should extend the full length of the trough and stand 2″ above the trough. This board is used only in front to keep the gate from going forward. The half-length board J at left bottom is omitted in building the gate. It is only added in the cut to show how the gate appears when dropped ready for pigs to eat. The gate should be hung about 1″ forward at top. This will insure it to drop in place when the prop is removed.

PREVENTING COWS FROM SUCKING.

The device shown in Fig. 295 nine times out of ten will cure cows from sucking themselves or others. Put it in the cow's nose and with a pair of large blacksmith pinchers close it enough to

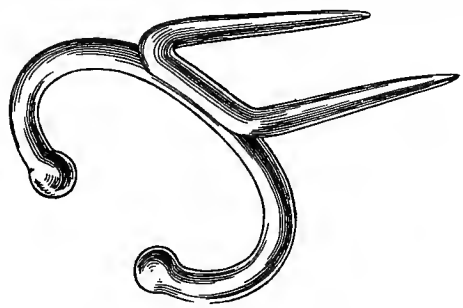


FIG. 295—NOSE PIECE FOR SUCKING COW.

prevent it coming out. To remove it run the handles of the pinchers through the ring and spread it. Smaller ones can be made for calves and heifers. A blacksmith can make one of these devices in a short time at small cost.

DEVICE FOR SELF-SUCKING COWS.

Cows addicted to the habit of sucking themselves should be taken in hand as soon as they

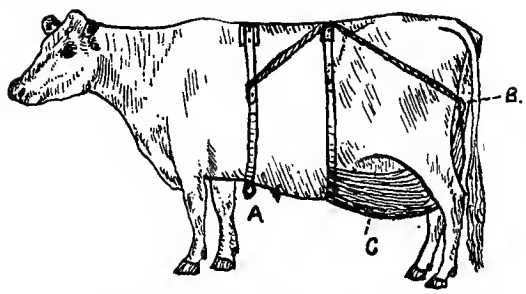


FIG. 296—DEVICE FOR SELF-SUCKING COWS.

are known to be self-suckers. The longer the habit remains unchecked the more difficult it will be to effect a cure. The only cure is some sort of a device to be worn by the cow. See Fig. 296. C shows the form to make canvas bag. A piece of iron is riveted on front belt to fit over back to keep harness from slipping to one side. B shows snap at rear end of canvas bag. A shows ring which is fastened on front belt to hold bag forward while milking in summer. Harness is made of 1-inch leather straps.

ANCHORING A BARN TO GROUND.

To anchor a barn to the ground by means of concrete blocks is quickly and cheaply done by means of the wooden form, a frustum of a pyramid, or a pyramid with the top cut off. It may be 12″ square on top, 24″ square at the bottom and 36″ high, imbedded in the ground according to the lay of the land about 24″; holes being dug at exactly the right places and to the right depth the form is accurately placed (this

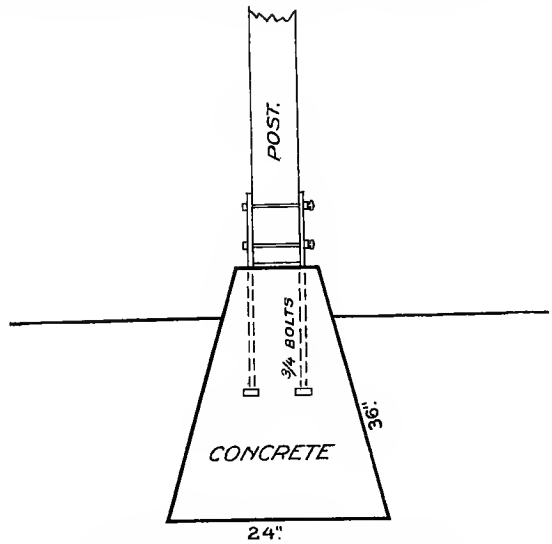
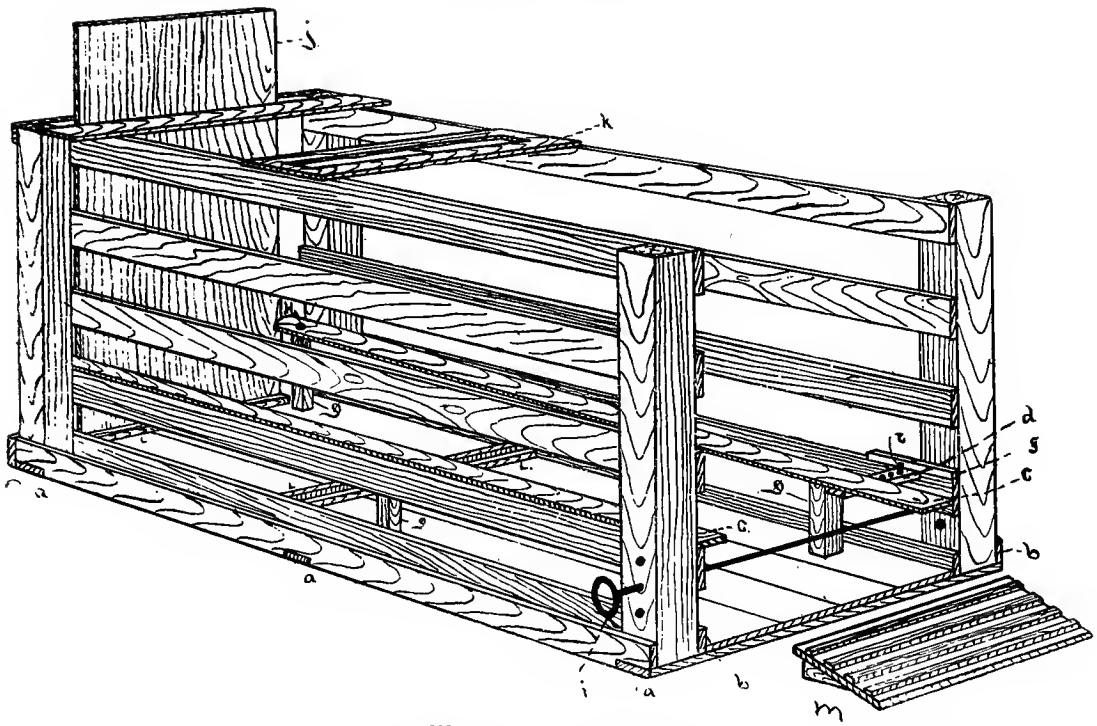


FIG. 297—ANCHORING A BARN TO THE GROUND.

is better done by the head carpenter) and the block built by ramming in concrete. Two bolts are imbedded in the concrete; they may well be flat strips with the lower ends turned over and at the upper ends holes drilled to receive ¾″ bolts transversely. These iron strips must be accurately placed to make easy work and when the building is raised to place, the post rests between them and transverse bolts hold it firmly in place. See Fig. 297.

BREEDING-BOX FOR SWINE.

The dimensions of the box (Fig. 298) are: length 5′ 6″, width 2′ and height 3′. The length of the short box, which may be made by moving the end board j into the slot k, is 3′ 6″. The corner posts are 2″ x 4″ scantling and the sides 1″ x 4″ strips; a a a are joists for nailing the



FIS. 298—BREEDING BOX FOR SWINE.

floor to; b b extra boards to which the joists are nailed to stiffen the sides of the box; c c are boar supports which hold the boar's weight during service. The one on the left is stationary, while the one on the right is adjustable to the size of the sow and should fit up tight against her side; d is a piece used to adjust the right-hand support; e is a pin which holds the support in place; f is a strip to hold d in the groove or mortise; the g's (of which there are six) are pieces that hold the supports solid and are 13″ in length; h is a wooden screw to hold the front end of the adjustable support in place; i is a ⅞″ rod which is placed behiud the sow to keep her from backing out of the box; j is a movable end board which is used to adjust the box to different length sows. When long sows are to be bred the board is placed in the end of the box, as shown in the diagram, and when short sows are bred the board is removed and placed in the slotted board k. L L are cleats which hold the bottom end of the board j in place; m is a platform used to raise a small boar high enough to serve a large sow.

A RACK FOR DEHORNING CATTLE AND FOR RINGING HOGS.

The illustrations (Figs. 300 and 301) are of a rack for dehorning cattle and ringing hogs. For sills use three pieces 4′ long and 4″ x 4″ mortised for bottom of posts 8″ each side of center to allow the side and bottom boards to drop into place. Four posts 4″ x 4″ and 5′ 4″ long and two posts 4″ x 4″ and 5′ 8″ long are tenoned to sills. Three cap pieces 2″ x 4″ and 4′ 2″ long are mortised at ends to receive tops of posts. The caps are of oak. One oak piece in front of

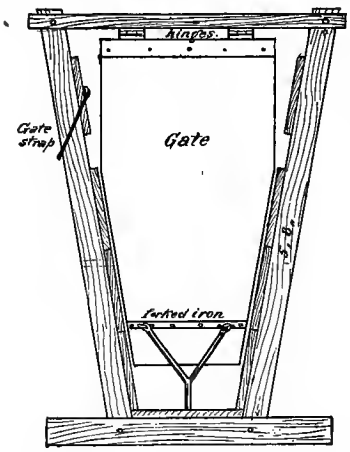


FIG. 300—A RACK FOR DERORNING CATTLE AND FOR RINGING HOGS (END VIEW).

the cap which holds the stanchion is 2″ x 2″ and 4′ 2″ long. The lower oak piece in front of stanchion is 2″ x 4″, 2′ long. The lumber is 2″ thick and 7′ long for sides. One board, 2″ x 17″, 7′ long is for the bottom. For stanchions in front one board 2″ x 10″, 5′ 6″; one board 2″ x 10″, 5′ 2″.

For back gate, two pieces 2″ x 12″, 4′ 4″ long, cut sloping to fit frame. It is put on with hinges as shown in the diagram. The gate is held up by a piece of iron 1′ long stapled to the upper board at the side of frame to allow the cattle to enter, and gate fastens when down with a forked piece of iron as shown in Fig. 300. Stanchions in front are bolted at the bottom between 2″ x 4″ oak piece and sill, leaving a space up and down in front 5″ wide. Two and one-half feet from the bottom of the stanchion slope out a place for animal's neck. The 2″ x 2″ oak piece is bolted to side of cap with blocks to allow the top of stanchions to open and close and work with a lever as shown in Fig. 301. The lever of wagon

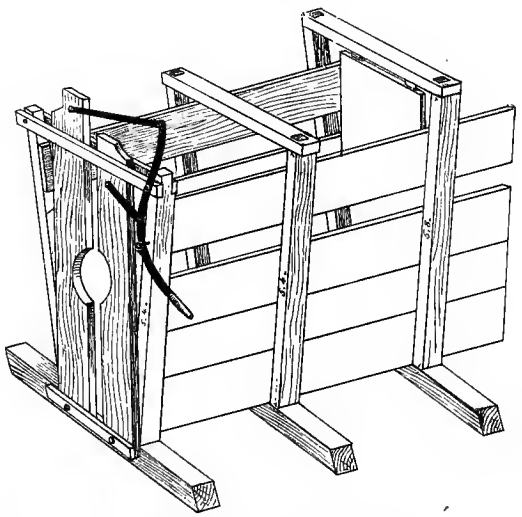


FIG. 301—A RACK FOR DEHORNING CATTLE AND FOR RINGING HOGS (SIDE AND FRONT VIEW).

tire is 5′ 6″ long. A ⅜″ hole is punched in top of lever. The second hole is 13½″ from top hole and the third hole 11″ from second hole. This lever is rounded at the lower part for a handle and bent, being bolted between oak piece and cap on corner of frame through middle hole of lever. The upper hole is fastened to the left-hand stanchion by two iron straps, one on each side of stanchion. These straps are 3′ long, ¼″ thick and 1¼″ wide. The lower hole is fastened to the right-hand stanchion with two pieces of strap iron 14″ long. When the stanchions are closed bore one or two ½″ holes in post back of lever, in which use iron pin to open and close the dehorner. Bore a hole outside of each post 1′ from the top to put rope around to hold the head. Also spike two wedge-shaped pieces outside of stanchions, as shown in diagram, to keep cattle from getting their knees fastened.

The experience of most operators is that the saw is the best implement to use in dehorning. Unless the horns are taken off very close they will bleed badly, and unless they are slanted with the natural slope of the head there will be an ugly square head, very unsightly to see. There must be some skin removed from the upper side of the horn.

A DEVICE FOR HOLDING HOGS.

The device shown in Fig. 299 for holding hogs by the head while ringing is simple and cheap in its construction and easy in its operation—so simple, in fact, that the mere illustration furnishes all the specifications necessary. The uprights should be firmly set in the ground and the upper piece of the stocks pinioned to the upright on a pivot at A. By nailing boards to

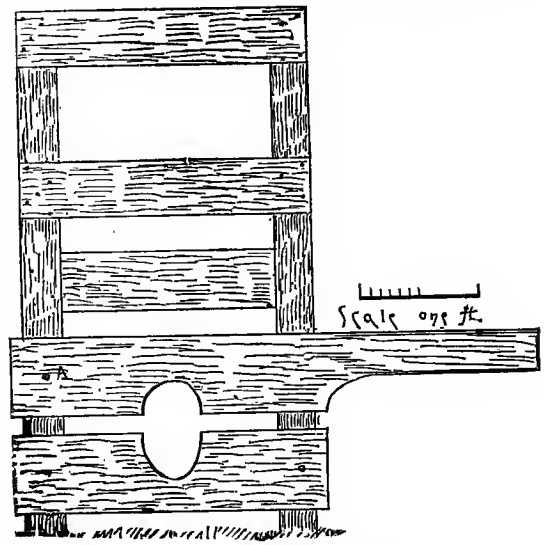


FIG. 299—A DEVICE FOR HOLDING HOGS.

the uprights on both sides in the rear a small chute may be formed by means of which the hogs may easily be driven into the "trap."

BULL STOCKS.

The diagram (Fig. 302) and description of stocks for securing a bull so that his feet may be trimmed or any other operation performed are herewith presented. Probably most of the stocks now in use at cattle breeding establishments in the Central West were patterned after the one built at Shadeland by the late Adams Earl. Such stocks are a very great convenience if not a necessity at all breeding establishments where the bull is accorded proper care.

The timber is pine or hemlock, and the floor the same, 3″ or 4″ thick. This gives a solid foundation to stand on, and in some cases the operator can trim the feet to advantage while the animal is standing on the floor. The side

timber D should be of oak; it extends beyond the frame and there are three holes bored through it. This is to bring the foot back as follows: buckle a strap around the foot just above the hoof (after the animal is drawn up), and bring the rope through one of these holes. This will bring the foot on top of D, and it can be tied there and the bottom of the foot pared off as much as necessary.

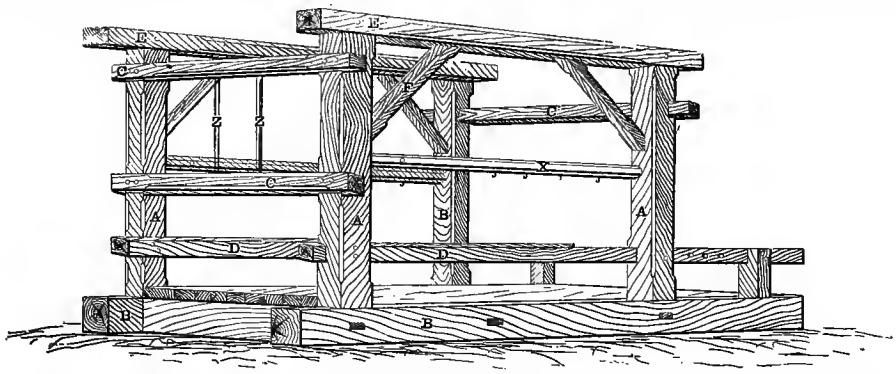


FIG. 302—BULL STOCKS

In the octagon roller are hooks to which the chains are fastened and two holes are bored in the roller to hold iron rods used in turning the roller and drawing the animal up. The chains are ordinary trace chains, five on each side. The belt is made with an iron rod on each end 1″ in diameter, and the belt fastened around this with chains, attached to rods. Use heavy leather. The drawing shows the front of stocks. The round sticks ZZ are removable from the top; usually take out one until the animal is led in and placed and then put the other one in, thus making the head secure. There is only one timber across the rear end of the stock, as shown by C.

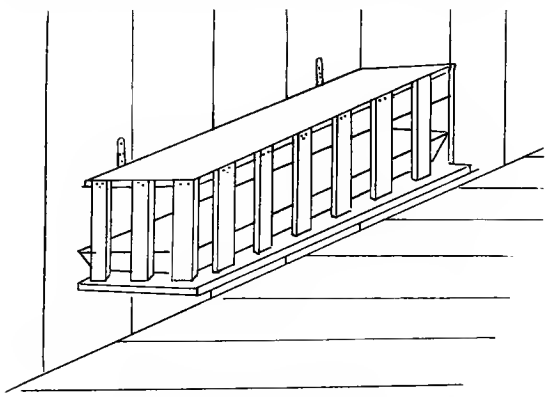


FIG. 305—POULTRY DRINKING FOUNTAIN.

It is a good idea to let the animal stand awhile in the stocks before drawing him up, and the time can be utilized in trimming off the ends of the hoofs with a chisel. The tools commonly used are a heavy mallet, an inch and a quarter chisel and two crooked knives (right and left), such as blacksmiths use. The bottom of the feet often require attention and this can be done best by swinging the animal up and drawing the feet back and using the crooked knives. The dimensions of timbers are as follows: A—6″ x 6″ by 7′ 6″; B—6″ x 6″ by 9′ 1½″; C—6″ x 6″ by 4′ 10½″; D—4″ x 4″ by 9′ 1″; E—6″ x 6″ by 6′ 8½″; F—4″ x 4″ by 2′; X—Octagon roller, 6′ 6″ long, 8″ diameter; size of belt, 2′ 11″ by 5′ 3″; length of chains, 3′ 5″ (five chains); Z—Round oak sticks, 1¾″ in diameter by 3′ 8″ in length (15″ apart). Distance between D and B (base) is 7″.

POULTRY DRINKING FOUNTAIN.

A simple drinking fountain for poultry (see Fig. 305) may be made as follows: Place an ordinary milk-pan on a block or shallow box, the top of which shall be 4″ or 5″ from the floor. The water or milk to be drunk by the fowls is to be placed in this pan. Over the pan is to be placed a board cover supported on laths about 8″ long, nailed to the cover so that they are about 2″ apart, the lower ends resting upon the box which forms the support of the pan. In order to drink from the pan it will be necessary for the fowls to insert their heads between these laths. The cover over the pan and the laths at the sides prevent the birds from fouling the water in any manner except in the act of drinking. Where drinking-pans of this kind are used it is very easy to cleanse and scald them with hot water as occasion demands. This arrangement can be carried a little further by placing a pan or what would be still better a long narrow dish, something like a tin bread-tray, on a low shelf a few inches from the floor, and hinge the cover to one side of the poultry-house so that it can be tipped up in front for the removal of the dish or for filling it with water. Whatever device is used

it must be easily cleaned and of free access to the fowls at all times.

FENCE-BREAKING BULLS.

Herewith is produced an illustration of an Australian device that is recommended by several breeders in the "island continent."

A block of wood is screwed on to each horn (see Fig. 303), and a wire stretched from block

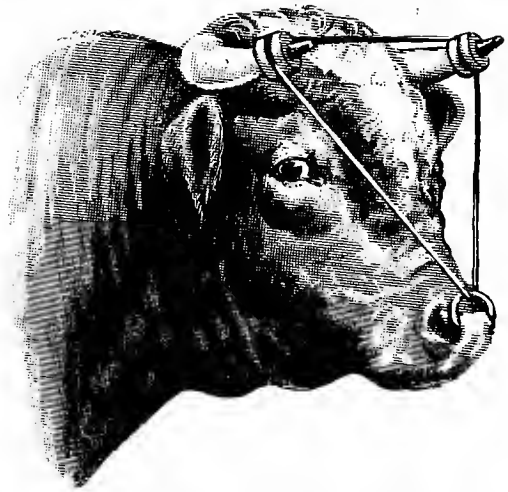


FIG. 303—FOR FENCE-BREAKING BULLS.

to block and also to the nose ring, as shown. So long as there is no pressure on the wires between the ring and the horns the nose ring is simply held upwards without any discomfort to the animal. Should the bull rush any other animal or attempt to get through any fence, the pressure pulls the nose ring upwards, causing considerable pain. It requires very few experiences to teach the animal that any misbehavior on his part is attended by suffering to himself. In place of the blocks on the horns the latter are sometimes bored through near the point and the wires secured. The blocks may also be put on in different ways, the object being to bring the wires from the horns to the nose away from the head and face.

A SHIPPING CRATE.

The illustration (Fig. 304) shows a strong shipping crate for hogs. It should be well built of pine or other light wood. For sheep a similar construction is good but ½″ lumber is heavy enough. About 16″ wide, 3½′ to 4′ long and 30″ to 36″ high are the right dimensions for a sheep crate. If it is to go a long journey wire in a small tin pail in one corner, so that the sheep can be watered. One can put a lot of green clover or grass in the crate at the beginning of the journey. Do not try to feed much grain nor to send a bag of it along unless a very dilute chop, mostly of bran, for a short period of starvation is better than feeding by expressmen. A neatly-built crate, a shipping tag bearing the

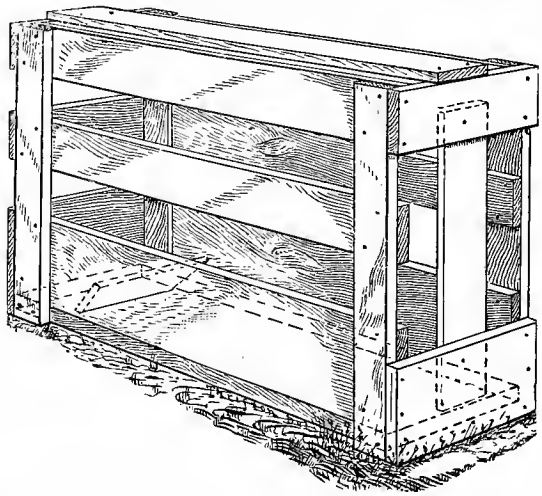


FIG. 304—A SHIPPING CRATE.

shipper's name and that of his farm will often aid in selling stock.

DEVICE FOR COVERING STACKS.

A simple and inexpensive device for the preservation of hay put up in ricks or stacks (Fig.

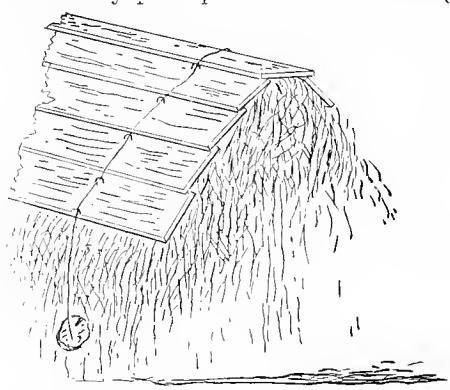


FIG. 306—DEVICE FOR COVERING STACKS.

306) is constructed as follows: Use common boards 12′ to 16′ long, a foot or more wide, putting one on top of the rick first, then slipping one on each side under the top one about two inches and fastening by driving a common fence staple over a No. 9 smooth wire just at the edge of the upper board so as to make a sharp bend in the wire over the edge of the upper board, and so on down as far as wanted; six to eight boards on each side are generally enough; then fasten a good-sized stone in the end of the wire and the thing is finished. Use two wires to each length of board about 2′ from the ends and as many sections as may be needed for the length

of rick, putting the middle section on last with the ends lapping over the next ones. In using the hay a single section is taken off by drawing out the staples and the rick cut down so as to leave the cover over the remainder. Boards and wire can be used over and over again.

A PORTABLE HOG-LOADER.

A device for loading hogs and sheep that is very handy, light and strong is shown in Fig. 307. It can be moved readily or it can be backed up to the wagon and by a rope or chain attached to the wagon bed and hauled to the distant pen or lot where hogs are to be loaded. It saves moving the hogs from their feed-lot to some strange place or corner, which always excites or worries some of them. By the use of a hurdle or two as many can be cut out from the drove as will load the wagon, or the chute and wagon can be backed up to the door of house or pen and the hogs enter the wagon without any worry.

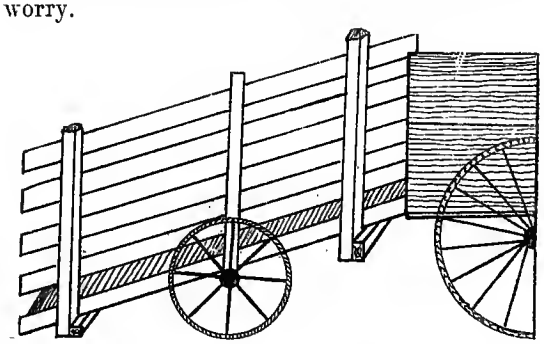


FIG. 307—A PORTABLE HOG-LOADER.

The cut (Fig. 307) represents one side of the chute set ready to load into the wagon. It is easily made. The bottom is two 12″ boards, 1″ thick and 10′ long. Each side has one board of the same dimensions and two boards 6″ wide and 1″ thick, with spaces of 4″. This makes the side 2′ 8″ high. The two uprights are 2″x4″ with a mortise 4″x1″ at top and bottom to receive ties that are tightened by a draw pin. The lower ties support the floor and are 16″ from the end of the floor boards, which also rest on the axle of the old buggy wheels used for moving the chute. A third or middle upright has a slot cut in the lower end large enough to drop down over the axle. By cutting the slot 4″ deep the ends extend below the axle 3″ and a 40-penny spike or wooden pin put through the upright just under the axle will keep it in place. The chute is 2′ in the clear and the bottom board of the side is nailed to the floor, which helps to stiffen floor and sides.

It will be more convenient to make the chute without the middle uprights, and before locating them place one end of the chute in the wagon bed and the other end on ground. Now put the axle and wheels under the chute and locate so the axle will be a support to the bottom, and then drop the middle upright down over the axle and nail to the side of the chute, using care to have the axle at right angles to the bottom, and put in the spike or pin to hold the axle in the slot of the upright. Cleats should be nailed in the bottom to keep stock from slipping. Before loading put straw in the wagon and down the chute, which makes the hogs take more kindly to the chute.

In some cases a cast-off pair of buggy wheels and axle have been used for the chute. Of course the axle must be cut so the hubs fit neatly against the middle uprights.

A FARM ICEHOUSE.

In building an icehouse one of the main objects is to secure isolation of the ice and to surround it with an adequate barrier of non-conducting materials. To do this a triple wall of planks or boards must be made from 12″ to 18″ apart and the spaces between each compactly

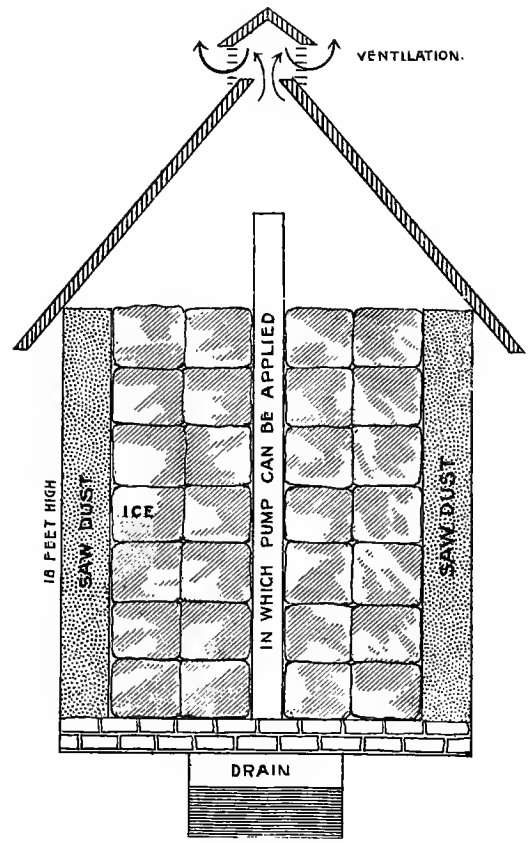


FIG. 308—A FARM ICEHOUSE (CROSS SECTION).

filled with sawdust or straw. The bottom must be equally well secured and a drain provided for the escape of water, yet not for the admission of air. The drain as shown in Fig. 308 is one of the cheapest and best that can be made. This drain is made by digging a hole 3′ deep and 4′ square; over this are laid logs say 5½′ long, 1′ wide and 6″ thick. This permits the water to run off the ice, but this will not be the case if the ice has been securely and properly packed. In addition to this drain is a box 17′ long made of 6″ boards in which can be applied whenever necessary a pump to draw out water. Over this box should be kept a lid so as to prevent the entrance of warm air. The dotted lines in Fig. 309 show that between the plank wall and ice is left a space 6″ or 8″ on all sides of the ice, which

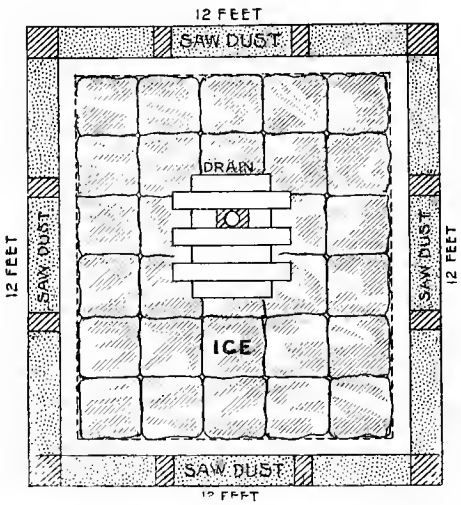


FIG. 309—A FARM ICEHOUSE FLOOR.

is packed in with straw or sawdust, all spaces or cracks between the cakes of ice being also filled in with sawdust.

When filling the house 5″ or 6″ of straw and sawdust are put on the floor. The ice is packed solidly on this. Experience proves that this surrounding of sawdust on all sides will keep the ice satisfactorily the entire summer. The wall on which the frame work is built is 1′ in height and is built of brick or stone. This icehouse is 12′ x 12′ and 17′ in height, not including roof. The house is filled in front by a door 3′ wide and 4′ high. About half of the middle (as drawn in Fig. 308) of the ridge is a cut-out, leaving an opening 4″ or 5″ wide, and over this is a cap, supported by a saddle piece at each end of it, leaving an opening on each side under it for ventilation. The cap extends far enough over to keep out rain. An icehouse of this kind will cost from $25 to $50. The entire house except the foundation is made of pine lumber.

A COMMERCIAL ICEHOUSE.

The icehouse shown in Figs. 310 and 311 was recently built in Iowa by W. M. Lambing to supply a superior quality of ice to a limited number of consumers in a near-by city. It is 36′ x 60′ and 22′ to the plates, 6′ of this height being below ground and the remaining 16′ above. The building holds about 1,400 tons of ice and cost about $1,500. A stone wall 2′ thick encloses the base-

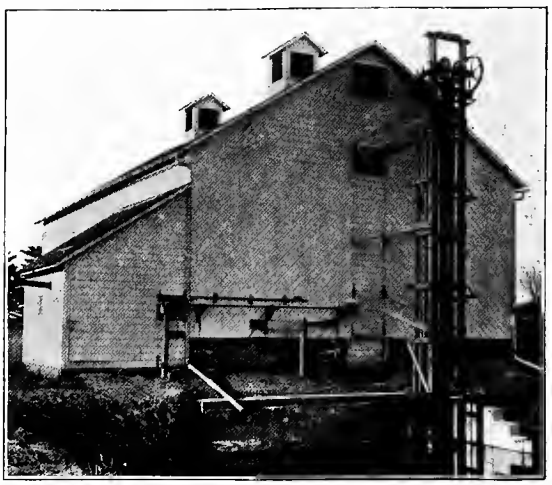


FIG. 310—A COMMERCIAL ICEHOUSE (SHOWING MACHINERY).

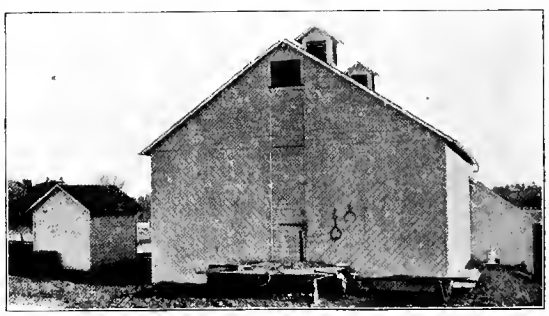


FIG. 311—COMMERCIAL ICEHOUSE (END VIEW).

ment. The studding used is 2″ x 10″, placed 2′ apart. Tar paper is placed on each side of the studding, forming a 10″ dead air space. The floor is made of cinders spread 4″ deep and a 4″ tile drain leads out from one corner, which is lower than the other corners. The inside lining consists of 8″ flooring put on diagonally and the outside is covered with 8″ drop siding nailed on diagonally, as shown in the engravings. The building attached to the icehouse contains a 6-horse power gasoline engine which hoists 4,500

pounds of ice per minute with the elevator shown standing in a lake.

THE VENTILATION OF STABLES.

Climates differ so widely that it is not possible to lay down a rule of building that will be perfectly adapted to all situations. So also do breeds differ in their requirements. The dairy cow should be kept fairly warm, yet she needs abundance of pure air; the beef steer, heavily fed, cares little for temperatures, so he is dry and out of the wind. Horses need especially to have plenty of fresh air.

Sheep can hardly have too much air. Being of an essentially delicate organization they suffer

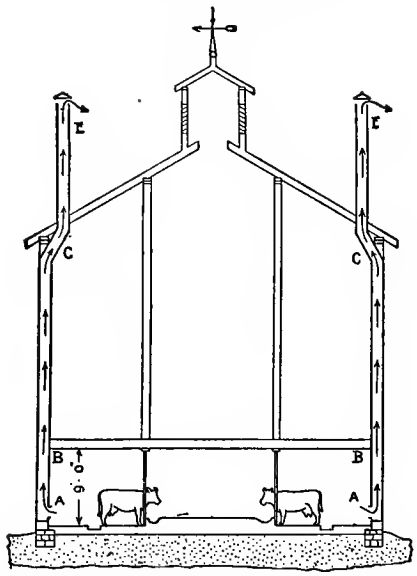


FIG. 312—VENTILATION OF STABLES.

severely from the poison of each other's breath. A good way to ventilate the sheep barn is to have on two sides or more a continuous series of doors; that is, make all the siding into doors and hang on hinges. This costs little more than to side up as it is usually done and is profitable from many standpoints. Let the doors be cut in two horizontally, the lower part about 3½′ high swinging as a gate swings, the upper part hinged at its upper edge and lifting upwards like a box lid so that it is supported by ropes with rings, or by little braces hung on hinges. It is advisable to put three strong hinges on the upper doors to keep them in shape, and as they will be exposed more or less they should be of good material. When the weather is suitable all these upper doors may be open, permitting a free circulation of air through the barn, making it practically a covered yard; and when storms blow one side or the other may be closed and only the lee-side left open.

An architect and builder of stables says that "if possible there should be a continuous but narrow opening high up so arranged that the stablemen cannot conveniently close it." This should not be on the north or west side, but on sheltered sides. Draughts on the horses are sources of trouble, yet in some way provision should be made for the ingress of a great abundance of air. Windows, 2′ x 3′, put as high as the story will allow, each one hinged at the middle of the sash and controlled by a greenhouse adjuster, which can manage several windows, provide the most ready means of letting in fresh air. The hay chutes may carry off more or less impure air and should be boxed tight, with doors to open for throwing in hay. There must be provision for the escape of the air at the roof.

Milking cows seem to be of a nervous and susceptible temperament, making it necessary for

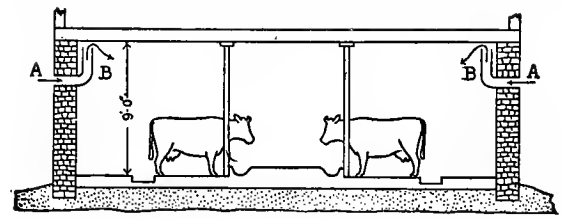


FIG. 313—VENTILATION OF STABLES.

them to be kept much warmer than other farm animals, so the supplying of fresh air and the removal of that which is impure is a most important matter. What is known as the King system works very effectively. It is the building of the stable to be as warm and as nearly air-tight as possible, using two or more layers of wood with building paper between. (See Figs. 312 and 313.) A covering of plaster on the outside would be of advantage in this connection and save the wood from weather as well. Unless the stable is nearly air-tight the ventilators will not work well.

Ingress of fresh air is provided above the cows. Prof. King says there should be an opening of 2′ x 2′ for 20 cows. It would perhaps be better to provide more than one opening and of somewhat greater capacity than that. Cow stables in cold climates should not be above 8′ in height, as the warm air raises out of reach of the animal, and her body is to warm the stable. The ingress of air is through a box that starts 2′ or 3′ below the ceiling, rises and enters at the ceiling level. This rise is to prevent the thing working the wrong way and to permit the warm air to escape at that point. The doors and windows should fit well and there should be no leakage of cold air from beneath the doors. The air escapes from

the stable through flues starting close to the floor level. These flues are better if they run straight up through the roof to the level of the peak. They may, however, be curved to follow the underside of the roof and escape at the peak through a cupola. These boxes in a cold climate should be of wood, else they may fill with frost in very severe weather from the condensation of the cows' breath. The size of the flues should be in excess of the size of the intakes; that is, for 20 cows there should be flues of a capacity of over 24″ x 24″ inside diameter; for 40 cows twice that amount. Warm air is lighter than cold air; the column of air in the flues is much warmer than the column outside, therefore it rises, cool air enters over the cows, flows over them, diffuses, sinks to the ground, enters the flues at that level and goes out from the building. Carbon dioxide, the poisonous product of breathing, is heavier than air and tends to settle to the floor, even though it is warm; it is thus drawn up and out. Also the coldest air in the stable is that which is drawn out. There should be, however, provision made for letting the air at the ceiling escape directly into the ventilators when that is desired. Both openings should be provided with valves that may be opened or closed at will.

DIPPING TANK CONSTRUCTION.

It behooves every stock owner to see that his animals are free from skin parasites. Young stock especially should receive attention in this matter. The cold rains, sleet and snow of winter are new experiences to many of them and even if they are in perfect condition and free from parasites the winter months tax their vitality severely. Matters will be much worse if lice, fleas, mites and ticks are robbing the young animals of the nourishment they need. Lousy animals may pull through the winter but the setback which they receive from the combined effects of parasites and cold stormy weather seriously impairs their usefulness.

As a means of correcting this condition, dipping is a question that stockmen can well afford to think about. It was not many years ago that sheep were the only animals supposed to require dipping, and the very suggestion of dipping hogs or cattle would have been ridiculed. Why such a sentiment should exist concerning the dipping of hogs and cattle is not clear. The latter animals suffer just as much from parasites as sheep do. Fortunately this prejudice is disappearing. Dipping is now recognized as the easiest and most satisfactory treatment of mange and other skin diseases of cattle and the best swine breeders of the country regard dipping as essential to their success. No domestic animal can thrive while it is being tormented by lice and the food it eats is being stolen by myriads of parasites. No manner of combating skin parasites and diseases is equal to that of submerging the animal affected in a fluid capable of destroying the pests, that is, dipping.

Of course it is essential that the fluid used should not be injurious to the animal itself. Spraying or scrubbing or dusting with insect powders or greasing with lard and sulphur will furnish some relief to animals infested with parasites, but there is nothing equal to a swim in a good penetrating dip. The selection of an efficient dip is essential, that is, one that will destroy unfailingly the parasites and at the same time have no bad effect upon the skin and hair or fleece. Coal-tar carbolic dips are being recognized as the most satisfactory preparations, since they come nearest meeting these requirements. They are death to lice and mites and other vermin, and at the same time their effect upon the skin and hair is stimulating and invigorating rather than otherwise.

The tank problem is one which puzzles many farmers. The galvanized iron tank fills a long-felt want for a light durable tank, without leaks and easily transported from place to place. Tanks of this description are manufactured in the large cities and are becoming popular throughout the country. Many regard a galvanized iron tank rather too expensive, especially where high freight charges must be added to original cost. Many farmers would prefer to construct a tank from materials that may be obtained close at home, working at the job at odd times and thus utilizing time which would otherwise be of little value. For this reason many will be glad to get plans and specifications for home-made tanks. Here is a plan for a tank made of lumber. The material should not cost more than $4 or $5. The directions are given for a tank of the following dimensions with the idea that they may be varied to suit the convenience of each particular case:

Length 8′; depth 4′; width (at bottom) 16″; width (at top) 20″; capacity about 360 gallons. These dimensions may easily be varied to suit the builder. A bottom width of 12″ or 14″ is wide enough for ordinary purposes; 6′ is long enough for the smaller animals, but we prefer an 8′ length, and 10′ is desirable for the larger animals.

The side pieces are of 2″x4″ material, 4′, 4″ in length. Make ten of these and mortise them into the sills (which are also of 2″x4″ material, 24″ long) in the manner shown in Fig. 314 which is a view from below. Fig. 314 will give a good idea of one of the U-shaped frames. Set these five frames upon a smooth level surface, 2′ apart and secure by temporary support. Be sure that

all are upright and true, then begin laying the sides. The sides and ends are of 7/8" tongued flooring. The sides are laid first. Plane the tongue from one piece of flooring and place this upon edge on the sills, planed edge down. There should be a small projection beyond each end-post. When the sides are finished these ends are sawed off leaving a smooth planed surface for the end boards to cover. Paint the tongue and groove of each board as it is laid.

After laying a few boards on one side build the other side to an equal height. The bottom can now be laid much more conveniently than if this is postponed until the sides are entirely enclosed. For the bottom use two 8′ planks. Bevel one side of each to the angle of the sides, put the planks in place and draw down with bolts through the sills. The bolts used in the middle sill should be about 2" longer than the others for the purpose of attaching the ladder which is described later. The crack between the two bottom planks should be covered with a thin strip of batting or other light material. Fig. 315 illustrates the appearance of the tank at this stage, except that one side is entirely boarded up. The sides are now finished and the projecting ends sawed off. Much depends on this job. If done properly the end boards when nailed securely will make a water-tight joint. Give the entire box a good coat of paint inside and outside.

A cement tank is easily and cheaply constructed and is very durable. It has the disad-

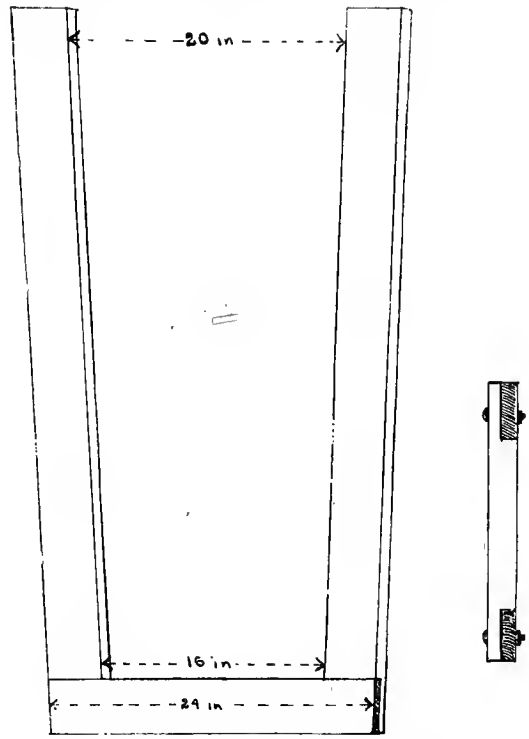


FIG. 314—DIPPING TANK CONSTRUCTION.

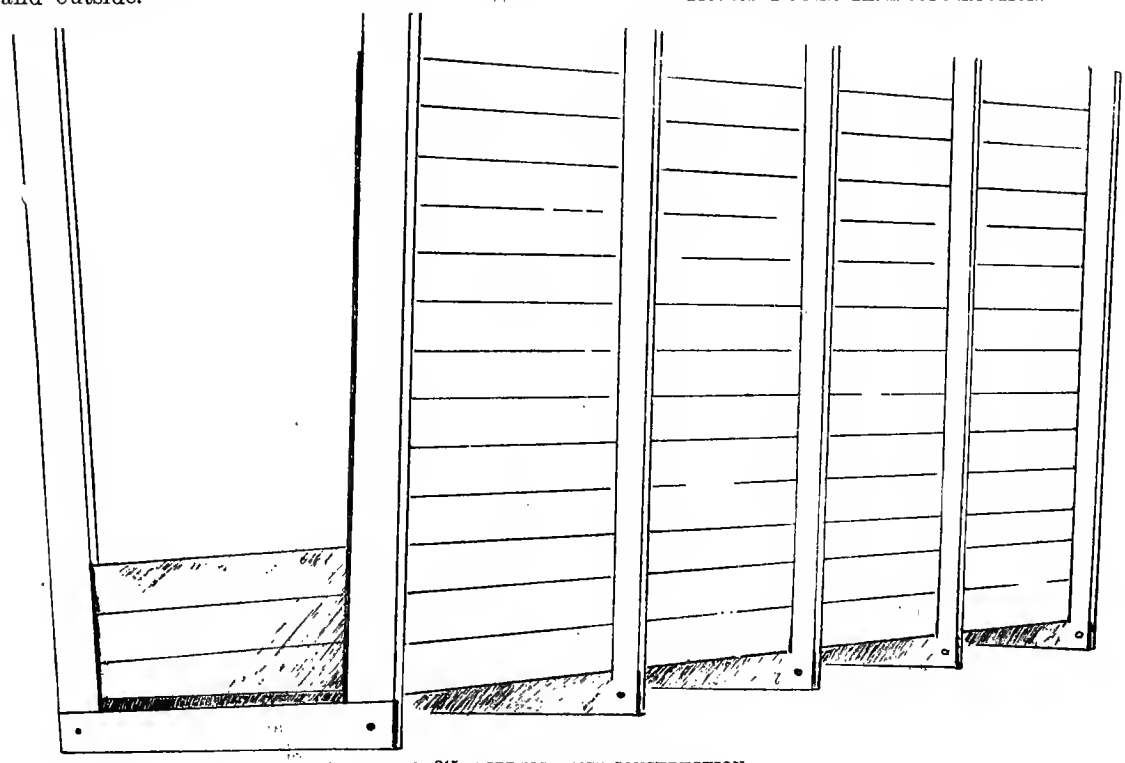


FIG. 315—DIPPING TANK CONSTRUCTION.

vantage of not being portable but otherwise is a very satisfactory tank. Select a rather high, well-drained spot where the earth is firm. If the selection can be such that a drain pipe can be laid from the bottom of the tank to the surface of the ground some distance away so much the better. Dig a pit of the following dimen-

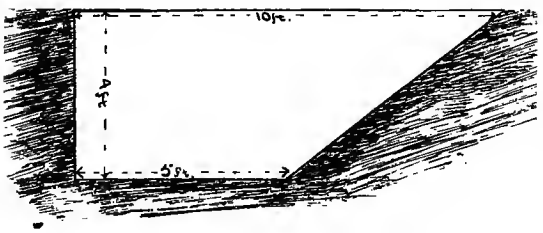


FIG. 316—DIPPING TANK CONSTRUCTION.

sions: Length (at top) 10′; length (at bottom) 5′; width (at bottom) 23″; width (at top) 28″; depth 4′. See Fig. 316. Smooth the sides of this pit and at the bottom place a 2″ layer of cinders, gravel or other material and tamp until firm.

Make a frame of rough lumber 4″ shorter and 8″ narrower than the pit. This frame will then have the following dimensions: Length (at top) 9′, 8″; length (at bottom) 4′, 8″; width (at bottom) 15″; width (at top) 20″; depth 4′. This frame has no floor at the bottom or on the

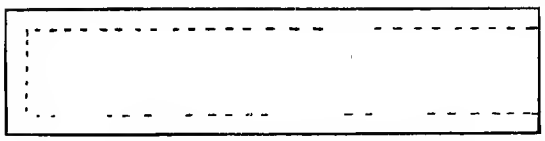


FIG. 317—DIPPING TANK CONSTRUCTION.

slant end. Place the frame in the pit as indicated in Fig. 317. This frame is of use only in constructing the side walls and the vertical end wall. The bottom and slant end are laid after the frame is removed.

Mix good Portland cement with coarse sand and gravel at the rate of one part cement to six parts sand. Such a tank will require from 350 to 400 pounds of cement and something like a ton of gravel and sand mixed. Fill in the sides and straight end with cement, tamping well as the filling is done. Allow plenty of time for the cement to set. Two weeks is not too long; if the ground is damp a longer time should be given. The pit should be covered by means of a tent or water-tight roof of some kind during this period, in order that chance showers may not interfere with the setting of the cement.

After the sides and one end are hard, remove the frame and lay the bottom and slant end with a trowel. In the angle where the bottom of the tank joins the slant end, two bolts should be embedded in the cement. The ends should project about two inches above the surface of the cement. These are for the attachment of a ladder to assist the animals in getting out of the tank. Round the joints where the sides join the bottom. If this is done properly and carefully there will be no danger of leakage. When the bottom is set the tank is ready for use.

A CATTLE DIPPING VAT.

The plan of the cattle-dipping plant illustrated in Fig. 318, is one that has been used in Nebraska by Richards & Comstock since they built their first dipping tank, about seven years ago, since which time they have made some slight alterations, but practically are using today the same vats they did before.

The dipping plant is thus described by the builders: At the entrance of the vat is a trap, as shown in the illustration, swinging on a pivot, and when a steer goes onto this trap it would tip up and precipitate the animal into the vat. We found that this was not satisfactory, so changed this trap to a slight incline, covering the incline with a piece of sheet steel 8′ in length. This incline would have a drop of 8″ or 10″ in 6′ and by wetting it before the cattle go onto it it becomes very slippery and acts as a toboggan slide, so that when they go out on this incline they slide off into the vat, completely submerging themselves, as the solution in the vat is about six feet deep.

This vat is made from 2″ yellow pine, the vat itself being set in the ground about 6′ or 8′. The ribs to hold the sides, as well as the bottom, are 4″x4s″ placed about 4′ apart and bolted both at the top and bottom so as to form a complete band around the tank.

We have one vat in which about 200,000 head of cattle have been dipped and the only part requiring any repairs is the incline where the cattle come out of the vat and the dripping pen floor.

The planks are beveled on the edges and the cracks packed with oakum, which makes a tighter joint than if they were tongued and grooved. The cost of one of these plants without boiler will average from $175 to $250, according to the material, labor and point at which it is constructed.

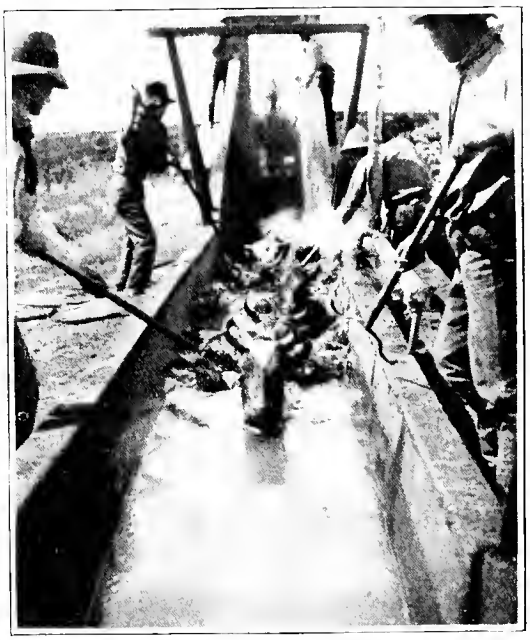
We have a man stand on the top of the vat with a pole arranged with an iron fork to go over the neck so as to crowd the steer under a second time, so that in swimming the length of the vat the animal is completely submerged twice.

Originally we used entirely cold preparations, but from careful observation as well as thorough tests we find that it should be used hot, so we

have installed 12-horse-power boilers at all of our plants to heat the solution to a temperature of 105°. This we do by placing the boiler as close to the dipping vat as possible, then running a steam pipe, generally 1¼″ size, down into the corner of the vat by the entrance, then along the bottom of the tank at one edge, and perforating the pipe with ⅛″ holes about 18″ apart and leaving the end of the steam pipe open, so that the steam is forced out from the pipe all along. We find that this keeps the temperature of the dip the same throughout the entire length of the vat.

There is no doubt that any dip that is really effective will kill germs and parasites much quicker if heated than when cold. Laboratory tests that one chemist reported to us show that the parasites were killed instantly in a solution at a temperature of 105°, while at a temperature of 32° after five minutes' immersion they still showed signs of life. When put in sperm culture after having been immersed for five minutes in a cold solution about 25 per cent or them still retained life. This shows beyond any doubt that the hot application is the proper one to use.

Many have erroneously believed that one dipping of an animal afflicted with lice or itch would



be sufficient. This is not true. The egg which is laid by the parasite does not hatch out for some time, generally from seven to ten days, and any

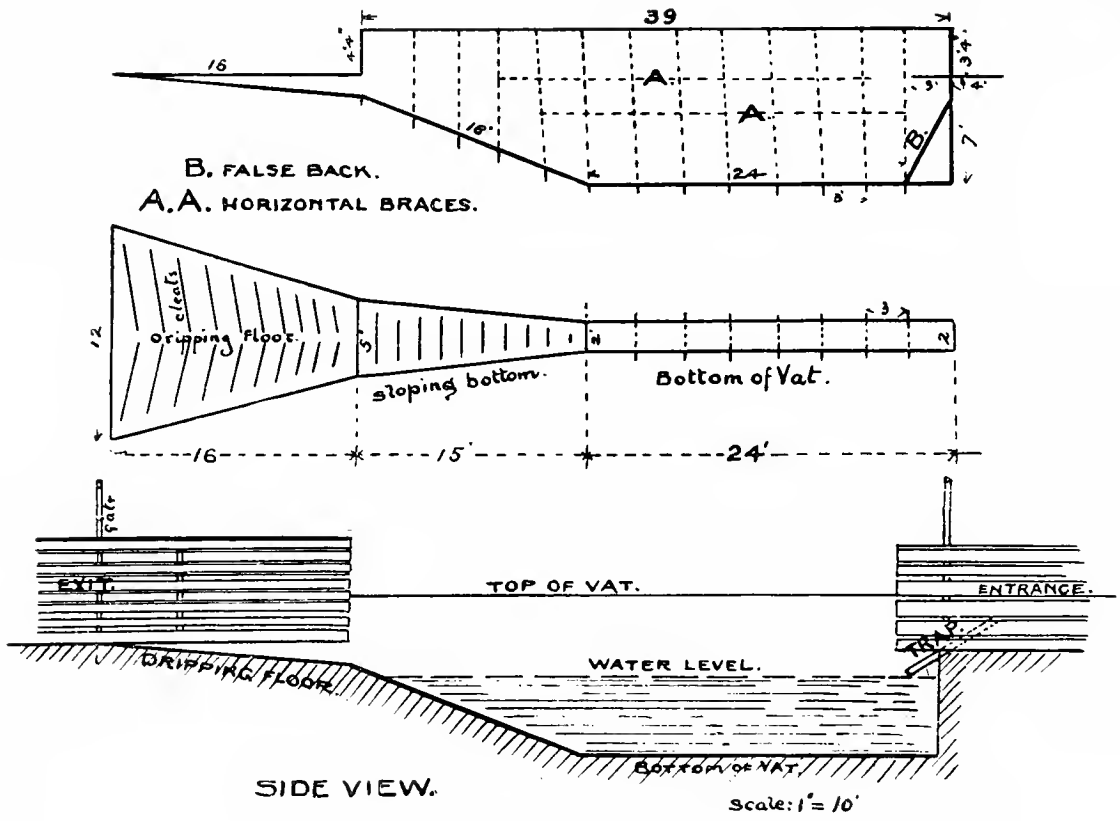


FIG. 318—A CATTLE DIPPING VAT.

preparation that is strong enough to kill these eggs would be very disastrous to the animal, so they require a second dipping from eight to eleven days after the first. This is effective with any good preparation provided the animals dipped have been kept in a pen, yard or pasture where there has been no infection, as the dipping of cattle is not a preventive, but simply a cure, and after dipping if they go to a post, shed or windmill tower or any similar thing or even lie down where the post or ground is infected they are very liable to become infected again.

Those who have been most successful in exterminating this trouble from their herds have adopted a system of dipping every week or ten days each animal that shows any indication of it until it is completely eradicated from the herd.

After dipping seven years we are pleased to say that we consider it an unqualified success, which every herdsman will have to adopt.

We dip all our cattle once a year to insure their being free from trouble. No new purchases are allowed to go onto our ranch until after they have been dipped.

A DIPPING VAT FOR SHEEP.

The strongest argument for the dipping of sheep lies in the fact that it is the best way of freeing them from external parasites. Sheep are very frequently troubled with red lice, which can hardly be seen, and yet they cause the sheep unlimited annoyance. Dipping will completely destroy them. Ticks cause the farm flocks of this country untold annoyance and for these dipping is thoroughly effective. Ticks and red lice do more damage than sheepmen are aware of, because the evidences of the annoyance which they give the sheep are not so marked as in some other troubles, but they are none the less a severe check to their well-doing. Dipping followed faithfully each year will completely remove the baneful results from the presence of these parasites. For the eradication of scab dipping stands first among remedial measures.

While the destruction of these pests is usually the mainly-accepted argument for dipping, yet there are others that, grouped together, make a more favorable endorsement for the operation. Among these may be briefly mentioned cleansing the skin, cleaning the wool and particularly encouraging the growth of the latter. To get the fullest returns in these directions the dipping should be done twice each year—in the spring shortly after shearing and again in the fall, just before the advent of winter.

Shortly after shearing it is an advantage to dip the flock thoroughly so as to cleanse the skin. This not only adds to the thrift of the sheep and the lambs, but in both instances it favors the secretion of yolk and this means the growth of a sound, live, uncotted fleece. Not only is the growth of wool better from it, but it adds directly to the function of the fleece as a protection to the sheep. The fleece of a sheep that has been dipped is more likely to remain intact throughout the season, as there is no cause for the sheep rubbing or otherwise breaking the compactness of it. Another advantage that seems to follow dipping at this time is that it seems to lessen the tendency of the sheep to lose its wool in spots too early in the season. When the fleece is clean and healthy it seems to continue growing longer and the wool does not peel in patches. Dipping in the fall is more for the purpose of removing from the fleece such foreign matter as may have been gathered during the summer and also freeing it from any of the parasites that prove such an annoyance during the winter season. Even under the best conditions the fleece is likely to become filled more or less with sand and other foreign matter which, during the winter, would produce such irritation as to cause the sheep to rub against sharp surfaces and destroy the compactness of the fleece.

By dipping sheep late in the fall, when the ground is frozen and then keeping them away from the straw stacks and feeding them in racks that prevent the chaff from falling into the wool, it is possible to put a clip on the spring market just as clean as if the sheep had been washed just previous to being shorn.

It is hard to measure the damage that is done to the fleece alone, to say nothing of the thrift of the sheep, by overlooking dipping in the fall. It is quite common to see sheep in the ordinary flocks of the country with fleeces badly broken by rubbing under wagons or some such means, through their endeavors to get rid of the irritation of the dirt that was left in the fleece. Such fleeces are likely to become cotted, especially if the sheep have not been dipped in the spring. Neglect of spring dipping is apt to result in a decreased secretion of yolk, a condition which favors cotting. A fiber of wool is covered with scales that overlap each other similarly to the shingles on a roof. To keep these scales down and to prevent them from warping just as shingles would do there must be a liberal supply of yolk in the fleece. If this yolk is not secreted, owing to the unthrifty condition of the skin, the scales rise and the fibers become so matted that they finally reach what is known as a cotted condition. Fleeces of this kind sell for 3 or 4 cents per pound less than they otherwise would on the general market.

The fleece of a sheep that has not been dipped, also one that is dirty or discolored, sells for

3 or 4 cents per pound less in the Chicago market than the fleece of a sheep that has been cleaned by dipping. These are facts that may be verified every spring. It is said that the benefits of dipping applied to a single fleece would pay for the dipping of more than a dozen sheep.

While the foregoing applies especially to breeding flocks, there are just as forcible reasons for dipping feeders. In feeding sheep it is of prime importance to reach as rapidly as possible that sappy and thrifty condition which is conducive to good gains. Dipping will hasten this and also remove the risk of unlimited losses through an outbreak of scab. It is good policy to take it for granted that the feeders are in need of dipping rather than wait for the evidence of it which usually comes when the sheep should go to market.

Dipping being so necessary it follows that it will pay to arrange for a dipping vat especially for this purpose. The cost of this is sometimes used as an argument against it, but this may be easily overcome by a number of farmers in a community combining and building a dipping vat for the use of all. It would be easy to drive the sheep to this plant and the ease with which they may be dipped would result in a considerable saving of labor.

The dipping vat (Fig. 319), which is herewith described, cost about $50 and could be

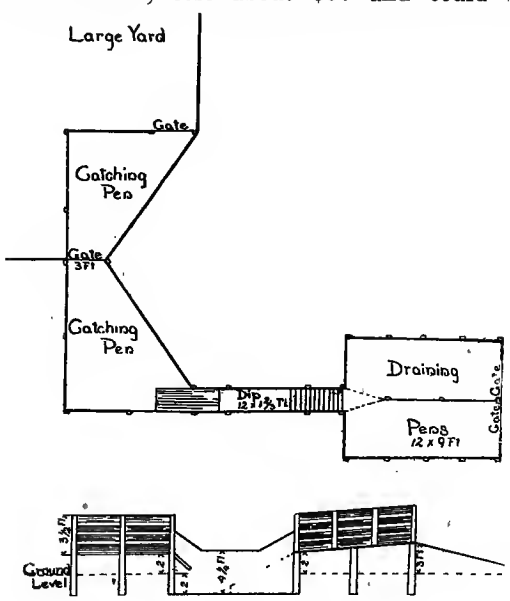


FIG. 319—DIPPING VAT FOR SHEEP.

built much more cheaply with some study as to the more economical use of material. There is one feature about this vat which is not wholly satisfactory and that is due to the fact that the planks used in making the vat are not as durable as they should be. Iron tanks which are manufactured would be much more satisfactory on that account. An ordinary wooden vat well painted will last several years, but in making a vat of this kind it would be better to put a little extra money in it so as to make it more durable.

The ground plan (Fig. 319), readily explains the general arrangement. The only point to which attention may be called in the construction of the yards is that there are no corners for the sheep to be crowded in, consequently they move along as freely as required. Each catching pen is exactly the same size as each of the draining pens, consequently they hold the same number of sheep. By taking these dimensions it is easy to run the sheep into the vat in groups just sufficient to fill each of the draining pens desired. The gates between the catching pens are sliding so that the sheep may readily pass through one from the other. The second catching pen, or the one nearest the dipping pen, is floored, as this tends to keep the feet of the sheep clean just before they enter the dip. The dipping vat is 12′ long, 4½′ deep, 20″ wide at the top end and 6″ wide at the bottom.

The vat holds about 125 pails of water with the dip required to give the fluid the needed strength. It is sufficient to dip about 125 sheep. This is allowing more fluid than is generally stated to be sufficient, but it is better to use this amount and thereby clean the fleeces thoroughly. This amount may be used in dipping sheep that have their fleeces about half grown. If the dipping is done shortly after shearing much less dip will be required.

For the comfort of the sheep it is advisable to choose a day that is not too warm, and care should be observed also in driving the sheep and penning them in that they do not become overheated. In passing them through the dip haste should be avoided. They should be allowed to remain as long as possible in the draining-pens. This is better for the sheep, saves dip and lessens the danger of poisoning afterwards. There have been cases where the sheep have died through eating grass on which they have been allowed to run before they had become thoroughly dry. Then if the sheep are turned out too hurriedly from the draining-pens and the sun is very warm it will dry out the fleece and add to its harshness.

This dipping vat is best for a flock of about 200 sheep. For a large number it would be preferable to make the vat longer so that more dip could be put in and more sheep run through. It is easy, however, to dip as many as 500 sheep with this vat, but more thorough dipping can be given by having the vat considerably longer. In

that case the yards and draining-pens should be enlarged so that the sheep could be run through in larger groups. It would seem that for dipping sheep on an extensive scale it would be an advantage to have the vat double, so that the sheep turns when it gets to the end and swims back and goes out near the point where it started. This long swim cleanses the fleece thoroughly.

For a farm flock a small dipping plant of this kind is admirably adapted, but it would be a more economical arrangement for several to combine and make a plant for this purpose.

THE WATER SUPPLY ON THE FARM.

Proximity of a source of pure water to the barn or stable is of more importance than might at first thought appear. To have a spring or running stream located a quarter of a mile from the barns often means a great deal of extra labor on the part of the work stock in traveling that distance every day for their water. Put the water even one-eighth of a mile from the barn and say the horses are watered there. Three trips a day with work horses mean three-quarters of a mile of travel, and generally not over the smoothest road. This amounts to some 270 miles each year and a farmer may live sixty years on his farm. Put it low and say that he travels but 15,000 miles in watering his horses during his lifetime. Is this not an important item in farm economies?

Small streams for watering live stock are usually of more detriment than value in that they are the distributors of many diseases. Swine-breeders know to their sorrow the cost of watering at running streams where contagion is so easily carried with the current.

A spring high enough above the farm so that water from it may be carried in iron pipes to the yards and buildings is of incalculable value on a stock farm. Next to this comes the well and wind-pump. Dug wells are sink-holes of iniquity, summer resorts for mice, toads, worms and insects, breeding places for disease germs. The drainage of the yards, distant privy vaults and sink-drains is often to these wells. The driven well, put down where there are tight veins of clay to keep out surface water, is generally safe. Nothing can get in it from above. Seepage of surface impurities is almost impossible. The driven well can be put any place where it is desired, within the stable, at the kitchen door, in the barn-yard or wherever it is most convenient.

Where the subsoil is of sand or gravel or is not water-tight the driven well will of course afford no security against water pollution. It will, however, in any case be free from danger of invasion by rats, mice or insects. A good driven well at the house will repay its cost many times over.

Best of all is the well which is sunk clear into the hard rock. Then if the steel tubing is sunk properly there can be no fear of contamination.

WATER SUPPLY FOR FARM BUILDINGS.

A farm water supply system is thus described by one who is using it: An ordinary windmill forces the water into an underground tank, from which it is conducted by pipes where wanted. The water being forced through a check-valve from the pump into the tank fills the bottom of the tank and thus compresses the air in the top of the tank. The pressure thus obtained is sufficient to force the water into any part of the barn or house. A water-pressure gauge is attached to the pipes just over the kitchen sink and shows at a glance and at all times the exact amount of pressure, obviating any liability to excessive pressure and danger of breaking pipes. The pump is usually shut off at forty pounds, when a hose can be attached and the water thrown over the house or barn. The tank may be located in the cellar. It may be an iron tank 3½′ in diameter and 12′ long, and located underground near the well. Its capacity is 30 barrels, but it is never full, as the air occupies some of the space in the tank. A 50-barrel tank for a stock or dairy farm would be advisable.

The system is very simple, easily constructed and anybody can manage it successfully. It puts the enterprising farmer on a par with the dwellers of cities as regards a water supply and it is not expensive. Including a well 100′ deep, a windmill and force pump, tank, 1,000′ of supply pipe, 400′ of sewer pipe, hydrants, sinks and bath-room fixtures this water system cost $600. It can generally be installed at much less cost than the estimate given. Very often a second-hand boiler good enough to hold water can be obtained at low cost. Any iron tank strong enough to sustain a pressure of about 40 pounds will serve. There is no danger of the water freezing, no luke-warm water in summer and there is a lively pressure at any point where it is led in pipes.

There is a simple system operating on the same plan applicable to houses. It consists of two or three of the cylindrical galvanized boilers, of about 40 gallons capacity, one of which is heated from the range. A force pump in the kitchen sink forces water into the bottom of the other two tanks and the air is compressed in the upper ends. This keeps the hot water reservoir always filled and gives pressure to force either cold or hot water to any part of the house. A small steam gauge registers the amount of pressure, which is usually about 20 pounds.

This system is so simple and cheap that any farmer can afford it and the satisfaction it gives is beyond calculation. Any plumber can put it in and it should not cost, piping and all, more than $40.

EARTH WATER TANK.

The plan illustrated in Fig. 320 shows a section of a dirt tank. The dimensions are given, but the size can be suited to requirements. A 100,000-gallon dirt tank costs very little more

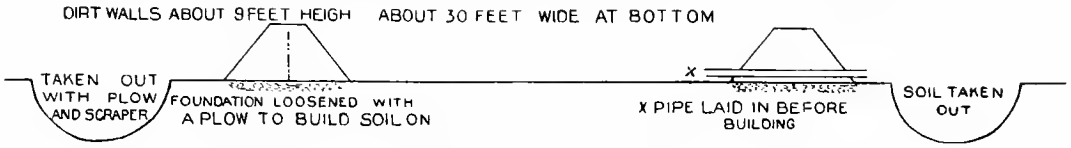


FIG. 320—EARTH WATER TANK.

than a 10,000-gallon cypress cistern. Hundreds of these dirt tanks have been made, and are being made in Western and Southwestern Texas.

A HINT ON CISTERN MAKING.

Many cisterns are faulty in construction in two important details: they are too shallow; the water gets warm quickly and soon fails. They are too flat on the bottom. The bottom of the cistern should be like the bottom of a funnel, V-shaped, and in the lowest apex should be the pipe connecting to the pump. Whatever sediment, leaves or trash gets into the cistern will at once be pumped out before it will have time to taint the water.

FARM DRAINAGE SYSTEM.

The drainage system shown in Fig. 321 is cheap and effective and can be put in by the farmer himself with but little help. The plan explains itself fully, the principle being that the bacteria which are generated by putrefaction multiply very quickly in the first septic tank, devouring the solid matter until almost eliminated. What passes into the second septic tank undergoes the same process, but to a less amount, owing to its being purer. The liquid now flows into the primary filter, being a trench 15′ long and 3′ to 4′ deep. At its bottom is a layer of broken stone, surmounted by a layer of gravel, which is underdrained by an Akron pipe, leading the filtered water into a siphon set a foot below the bed and made of the same piping. The secondary filter, reached through the siphon, consists of an air chamber of cobblestones, above which rests three feet of double-screened gravel and sand. An 8′ pipe runs from the surface of the ground into this air chamber and by means of a force pump the purified water is raised.

The septic tanks must be water-tight and sealed practically air-tight on top by an iron manhole. The bacteria thrive without oxygen, and sewer gas will not generate unless a certain amount of air space is provided. One cubic yard of filtering space is sufficient for one person. In this plan 50′ of filter space has been provided with 15 cubic yards of filtering material in this instance, because 15 is the average number of persons supposed to occupy the farm and

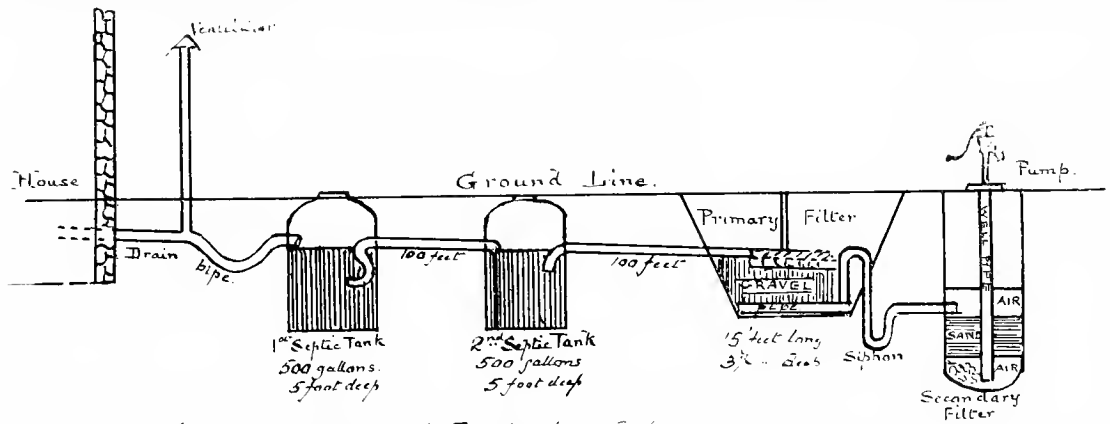


FIG. 321—FARM DRAINAGE SYSTEM.

using it. This system is becoming popular both for private and public places.

WATER CLOSETS.

There is no reason why sanitary conditions on the farm should be so objectionable as they are often found. Disease on farms is often traceable to contamination of water by filthy cess-pools. In these days of windmills and force pumps there seems to be no reason why country people should be without the advantages of water in any part of the house desired.

Perhaps no one thing adds more to the charm and healthfulness of a dwelling than a bath-tub. There is nothing that can be added to the home that will give more pleasure to all the family than the bath-tub and a plentiful supply of water always at hand, hot or cold. A bath-room may be fitted up with porcelain-lined tub, water closet and all for about $100.

The water closet if properly constructed and the drainage from it carried off a sufficient distance is the most sanitary of all systems. One should avoid the use of an underground cess-pool near the house to receive drainage from the bath-room. It should be carried to a distance, the farther the better.

The well that supplies the drinking water should be a driven well and should, if possible, penetrate the earth deep enough to put several feet of impervious clay between the water supply and surface drainage. Such a well may cost a trifle more at the start but it is by many considered cheaper in the long run.

Privies with vaults or cess-pools below are universally condemned. Beneath the privy put an impervious lining of cement, so that under no circumstances can any drainage from it pollute the soil below. Make a dust-bin in the privy, lining it with sheet-iron, so that if necessary in winter dry ashes may be used instead of dust. Beneath the seats there may be placed large galvanized iron buckets, or if preferred square buckets of the same material. These buckets are easily emptied and it should be attended to as regularly as any other farm-work.

WATER IN THE COW STABLE.

Where it is desired to water cows in their stalls there is perhaps nothing so satisfactory as the

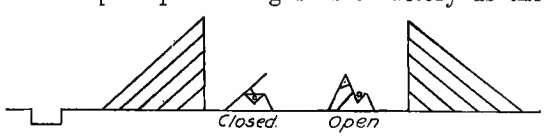


FIG. 322—WATER IN THE COW STABLE.

simple trough that is covered by a hinged cover, which when closed helps make the front of the manger. This trough should be made of concrete, if the floor and manger are of concrete. The trough may be 8″ wide, 6″ deep and with a slight incline at the bottom, level at top and a plug at the lower end that will drain it each time it is used. One user of this system has a 1¼″ pipe in the bottom of his trough with a ¼″ hole opposite each cow, so that the water does not flow appreciably from one cow to another. (See Fig. 322.)

FORMULA FOR WHITEWASH.

Take a half bushel of unslacked lime, slack it with boiling water, cover during the process to keep in steam, strain the liquid through a fine sieve or strainer, and add to it a peck of salt, previously dissolved in warm water; three pounds of ground rice boiled to a thin paste and stirred in while hot; half a pound Spanish whiting and one pound of glue, previously dissolved by soaking in cold water, and then hanging over the fire in a small pot hung in a larger one filled with water, add five gallons of hot water to the mixture, stir well and let it stand a few days covered from dirt. It should be applied hot, for which purpose it can be kept in a portable furnace. Whitewash makes things look neat and clean and is especially adapted to the inside of stables and sheds. For outside work a little tint added to it makes it better. Pretty tints of yellow are made by the use of yellow ochre. It is necessary to use considerable of the ochre. It is much lighter after it is dry than it appears when first put on. Where outside plastering is done this limewash with ochre in it is admirable. The addition of ochre to the wash seems to add to its permanence and to make it less liable to rub off. The essential thing in making limewash seems to be to have good fresh lime, slake it in boiling water, add some corn starch or flour paste or paste made from boiled rice, which is supposed to make it stick, and some glue.

ROOFS AND ROOFING.

For roofs of farm buildings slate and good shingles are popular. Steel roofing unless kept well painted is of very short usefulness. Painting makes it costly. It is hot in summer, drips in cool weather and is sometimes noisy. It is, to be sure, proof against sparks. Slate in the long run is perhaps the cheapest of all roofs if well laid. Shingles come next. Make the roofs with an angle of 45 degrees. Lay them with either galvanized nails or the old-fashioned cut nails. Do not be deceived with the small wire nails which rust off in a few years. A shingle roof will last a long time if the shingles are boiled in linseed oil. Put in a little color if you like. A warm red makes a roof look well. Do not paint the butts of shingles under the impression that

it will make them more durable. This will really hasten decay.

WING'S COW STALL.

Joseph E. Wing describes this stall thus: There are three essentials to a perfect stall: that it be comfortable for the cow, that it keep her clean, and that it be convenient for the man who cares for the cow. The stall I describe (see Fig. 323)

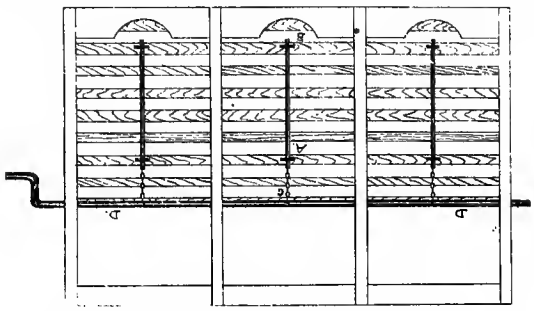


FIG. 323—WING'S COW STALL.

is nearly perfect in all these particulars. I am indebted to Geo. E. Scott of Ohio for my first knowledge of this stall, but I have since changed it slightly from his model.

The cement floor is admirable. Let it extend forward far enough to form the bottom of the feed box at A (Fig. 324). Imbedded in it step the foot of the post C, and place the 2″x4″ on which rest the ends of the front posts at A. Let the manure trench be 16″ wide and 8″ or 10″ deep. This depth permits the use of plenty of absorbents and also prevents the cows from stepping into the ditch either when standing in

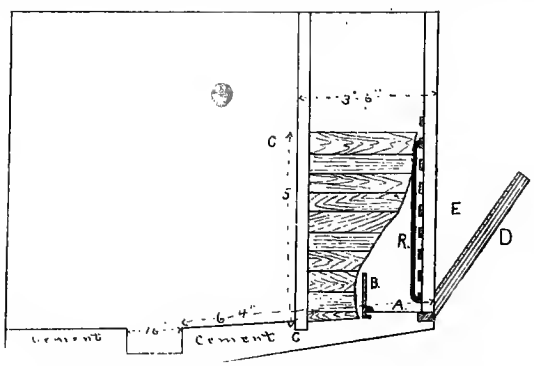


FIG. 324—WING'S COW STALL SHOWING CEMENT FLOOR.

their stalls or when passing out and in. The distance back of the ditch may be 3′ or more, according to space at hand. From B to trench let there be a slope of not more than 4″. From the edge of the trench to the front of the stall at A the distance should be from 6′ to 6′ 8″, according to the size of the cows to be stabled. The partitions between the cows are 5′ high and 3′ 6″ long and in the drawing are shown cut away to give sight of the ¾″ iron rod R, on which slides the chain that confines the cow. This rod is best placed midway between the partitions, as then the cow can lick herself on either side.

The ends of the 1″ x 3″ laths that form the front of the manger are shown. They should be spaced about 4″ apart. The cow draws her hay through these spaces. The board B is about 1′ high and hollowed slightly in the center where the cow's neck comes when she lies down. The one-quarter round keeps it solid and makes it easier for her to clean the meal out of her box. The partitions go clear across the manger and feed-boxes. The sloping side of the manger D is tight, so that meal may be poured thereon and allowed to run down into the feed-box below. Hay is put in at E. The space E is not partitioned off but is continuous along the entire front of the cows. A box for bran may easily be made below the sloping board D.

The advantage of this stall is that as the cow cannot push ahead, being restrained by the slats in front of her, she is compelled to drop her manure in the gutter. She will not step in this, as it would be uncomfortable for her to do so and the real and practical working of the thing is perfection. We have fitted a small stable with these stalls and the cows have never soiled themselves in it since it was made.

Place the partitions from 3′ 6″ apart to 4′, according to the size of the cows to be stabled. The partitions being high and tight prevent cows annoying each other, and being short give room to the milker and groom and also cause the cows to present a handsome appearance when viewed from the side or rear. The rod R is bolted at each end, but if a safe fire-escape is wanted it should be arranged as shown in Fig. 323. Here the rod slips through the eyes of the eye bolts A and B and is held suspended by the small chain C. This is riveted to the 1½″ gas pipe D, which has a short piece turned down to make a crank at one end, as E. This pipe extends along the entire row of cattle and turns easily in its supports. When there is danger or the cows are to be loosened a few turns of the crank winds all the chains and raises the rods out of their places, when the cow chains slip off and the cows are free. It may pay to fit a stable with this simple device with a view of freeing cows at any time when they are to be watered or turned out. Of course the chains would be unwound before the cows are put back in their stalls. This device is, so far as I know, original with me.

THE VAN NORMAN COW STALL.

The ideal cow stall should have among other requisites the following: a fastener that will hold

the animal securely, be easy to fasten when securing the animal and to unfasten when turning it out. The fastener should be so arranged that there is no danger of the animal getting the feet caught in it, and should give the maximum of liberty commensurate with cleanliness. The stall should be so constructed as to keep the animal clean and absolutely to prevent one animal from injuring another by stepping on the udder or by hooking and from frightening another by being able almost to reach it. The manger should hold the necessary feed and roughage, keeping it within reach of the animal, preventing it being gotten

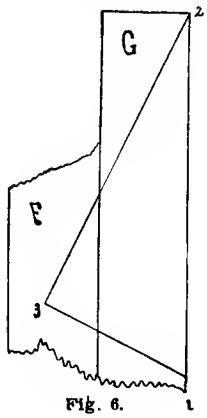


Fig. 6.

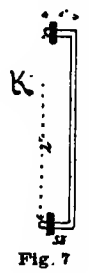


Fig. 7

FIG 2

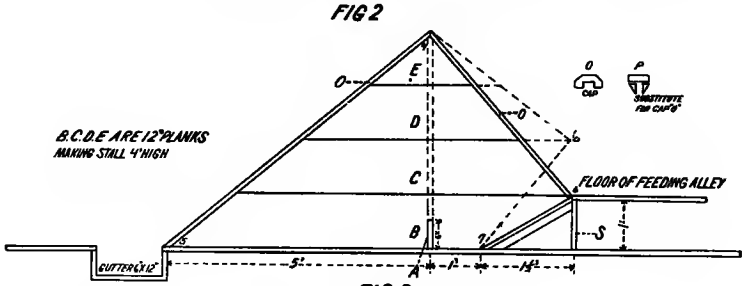


FIG 3

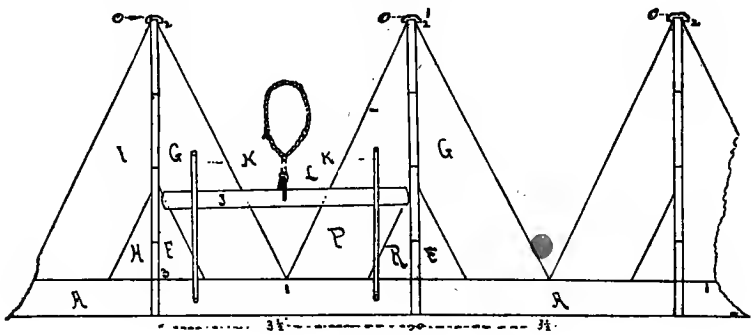


Fig 4.

under foot and should be easily cleaned of all refuse matter. Often the owner of a herd of cattle desires a stall that will expose to the visitor's view as much of each animal as possible without lessening the security to his animals. A stall should be inexpensive and strong. These conditions are met fully in the cow stall designed by Prof. H. E. Van Norman of the Indiana Experiment Station.

Fig. 2 represents the arrangement for two rows of stalls facing each other with the feeding alley raised to the top of the manger, allowing feed and hay to be swept into the manger and refuse to be swept out of the manger into the alley for removal. The stall may be constructed of 2″ lumber, dressed on two sides, or if to be whitewashed 1½″ stuff, rough, will hold the whitewash better than if smooth. These are standard sizes of lumber, but 1½″ dressed and 1¼″ rough are strong enough. For dairy cows of average size stalls 3′ 6″ from center to center and 5′ from gutter to manger will be about right. The animal should have just room to stand comfortably with hind feet an inch from the gutter and front feet just back of A in Fig. 3. A desirable arrangement is to place the timber A 5′ from the gutter at one end of the barn and enough closer at the other end to fit the smallest animal, thus giving the stalls varied lengths.

To build the stall place the 2″ x 6″ A (Fig. 3) in position 5′ or less from the gutter, then the raised feeding floor should be built with the joist S 2½′ in the clear from A; then cut the plank B and fasten in place, and successively planks C, D and E, holding them temporarily with a cleat until F and G are secured. To cut F and G, lay two pieces of plank on the floor, and on the one G (Fig. 6) lay off the distance 1 to 2 along the edge equal to the distance from the top of partition 2 (Fig. 4) to middle of manger on top of A at 1, Fig. 4; then mark off 2-3 and 3-1,

making the corner at 3 exactly square. It will make little difference if planks G and P, Fig. 4, do not touch at 1. When properly fitted toe nail G to A at 1, and nail B, C, D and E to F and G; then toe nail H and I in place. The partition between the stalls is now held securely in place and the operation may be repeated for as many stalls as wanted.

It is well to leave the planks B, C, D, E a little long, or even square and when in position draw lines from 4 to 5 and 4 to 6, Fig. 3, and saw off along these lines. The ends of the planks B, C, D and E should be covered with a partition cap O, Fig. 3, which holds them in place and gives a finished appearance to the stalls. In the absence of the capping O, strips as shown at P, Fig. 3, may be used. The bar J, Fig. 4, should be 1″ shorter than the distance between partitions and made of 1″ x 3″ light strong wood, round corners and slides behind iron staples. K, Figs. 4 and 7, are made of ½″ round iron, with nuts on the end or with a hole and key. These staples K should be placed 9″ from the partition and lower end near the floor. In the middle of J place a clevis of 1″ x ⅛″ strap iron, in which to fasten a common chain tie. Bore a hole for clevis bolt just above the middle of bar. This bar should hang far enough from the neck to allow the cow to stand comfortably with the head in a natural position. Where conditions make the feeding alley impracticable the front of the manger may be arranged on the plan of the dotted lines in Fig. 3. If desired a 2″ x 2″ piece may be run along on top of the stalls at 2, Fig. 4, though it is not recommended. It has been suggested that

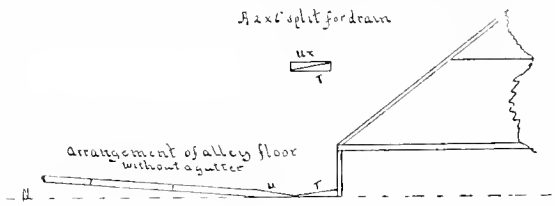


Fig 5

instead of the gutter a drop be arranged, as shown in Fig. 5. T and U are made of a 2″ x 6″, split diagonally.

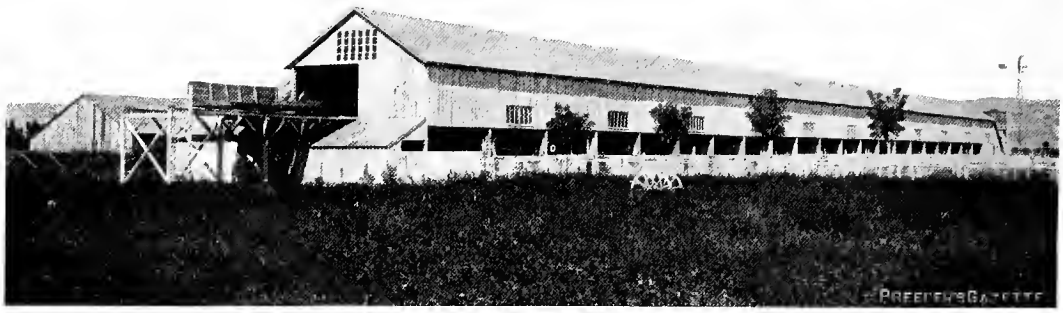
Commenting on the Van Norman stall Joseph E. Wing says: "It is the simplest, cheapest and in some ways the most hygienic stall of them all. It gives an uninterrupted view of the cattle. It does not waste the feed. The objection to it is that cows that are wild are not so readily secured as with some other stalls and there is some noise when cattle are feeding, owing to their being fastened to a sliding bar in front. It keeps them clean and they are comfortable."

APPENDIX.

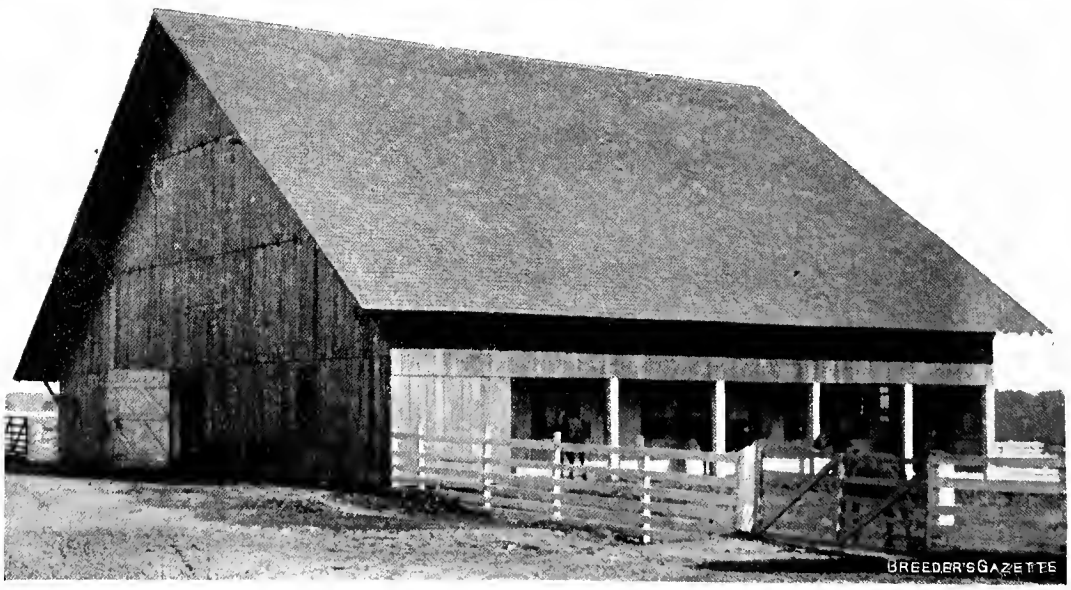
Since the foregoing pages were put to press some additional views of barns and other farm buildings have come to hand. While we are without details as to dimensions and construction in these cases we nevertheless have deemed them of sufficient general interest to be incorporated in a supplementary way in this volume. Possibly some hints of value may be gleaned from these illustrations, most of which are from recent photographs.

THE YARD AND MAIN BUILDINGS ON THE FARM OF W. R. COFMAN, FAIRFIELD CO., OHIO.

A PICTURESQUE WELL SHELTERED FARM IN WESTERN MAINE.



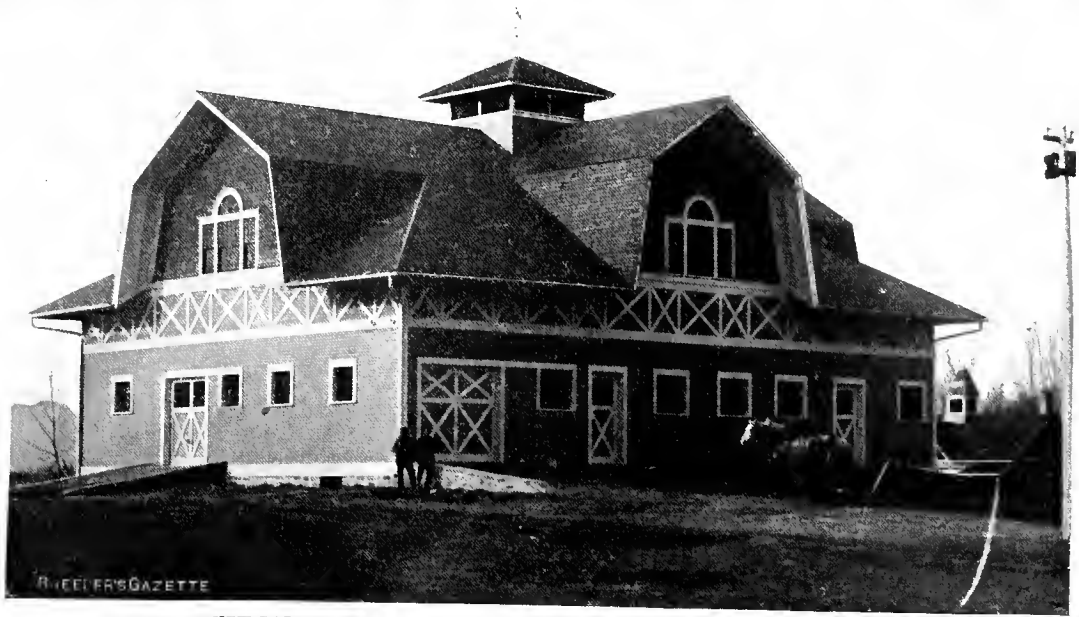
A UTAH SHEEP SHED. SEE DESCRIPTION, PAGE 102.



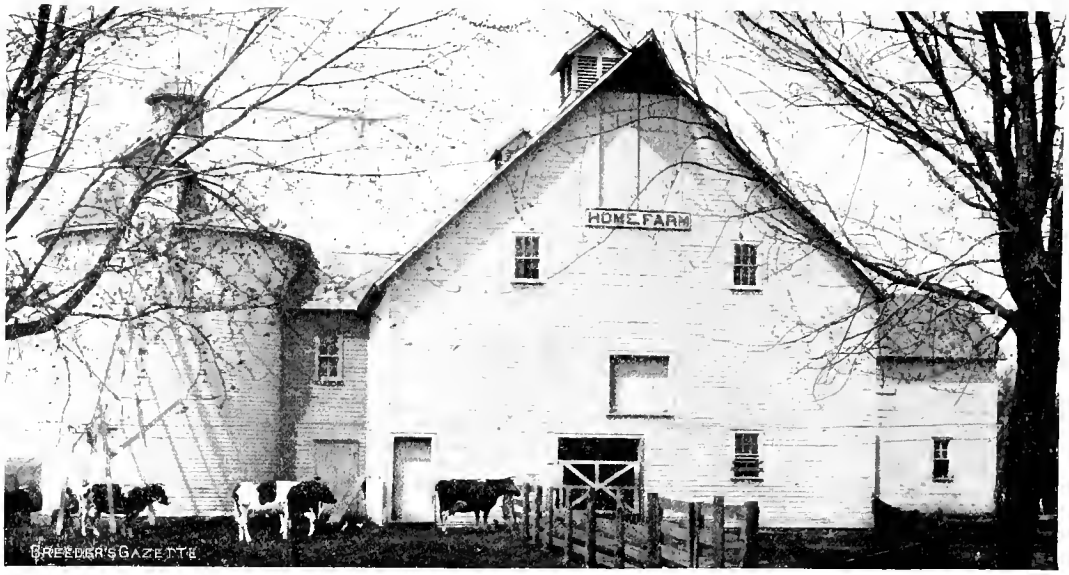
A MODEL KENTUCKY MULE STABLE.

EXPERIMENT STATION BARN AND JUDGING PAVILION AT AMES, IA.

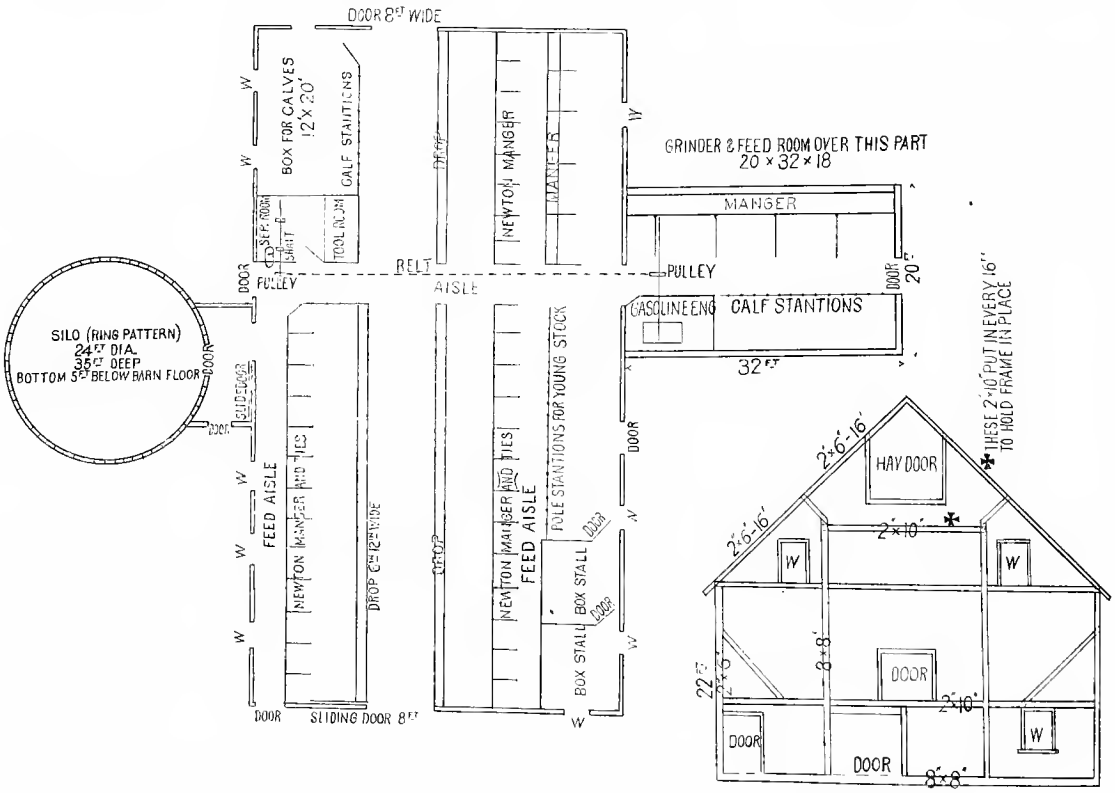
ARRANGEMENT OF BARNS ON A CENTRAL MICHIGAN FARM.



NEW BARN AT THE COLORADO AGRICULTURAL COLLEGE, FORT COLLINS.



AN IOWA DAIRY BARN SHOWING SILO—W. B. BARNEY & CO., FRANKLIN CO.

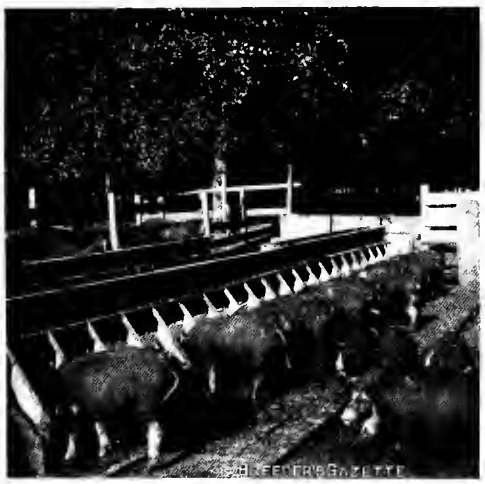


PLAN AND END ELEVATION OF IOWA DAIRY BARN—W. B. BARNEY & CO., FRANKLIN CO.

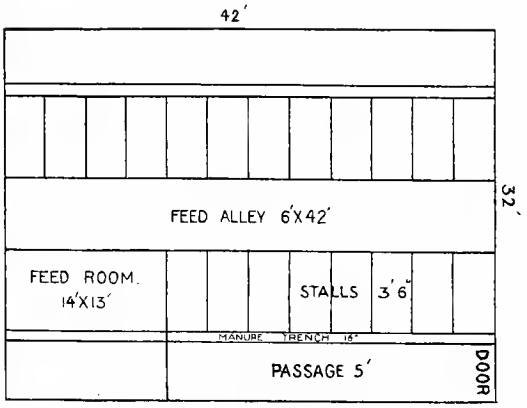
STABLES FOR STOCK ON PENNSYLVANIA FARM OF SENATOR P. C. KNOX.

PRIVATE STABLES AT THE COUNTRY PLACE OF SENATOR P. C. KNOX OF PENNSYLVANIA.

ARRANGEMENT OF BARNS AND SILO IN THE YARDS OF SMITH & M'GREGOR, WASHINGTON CO., MINN.



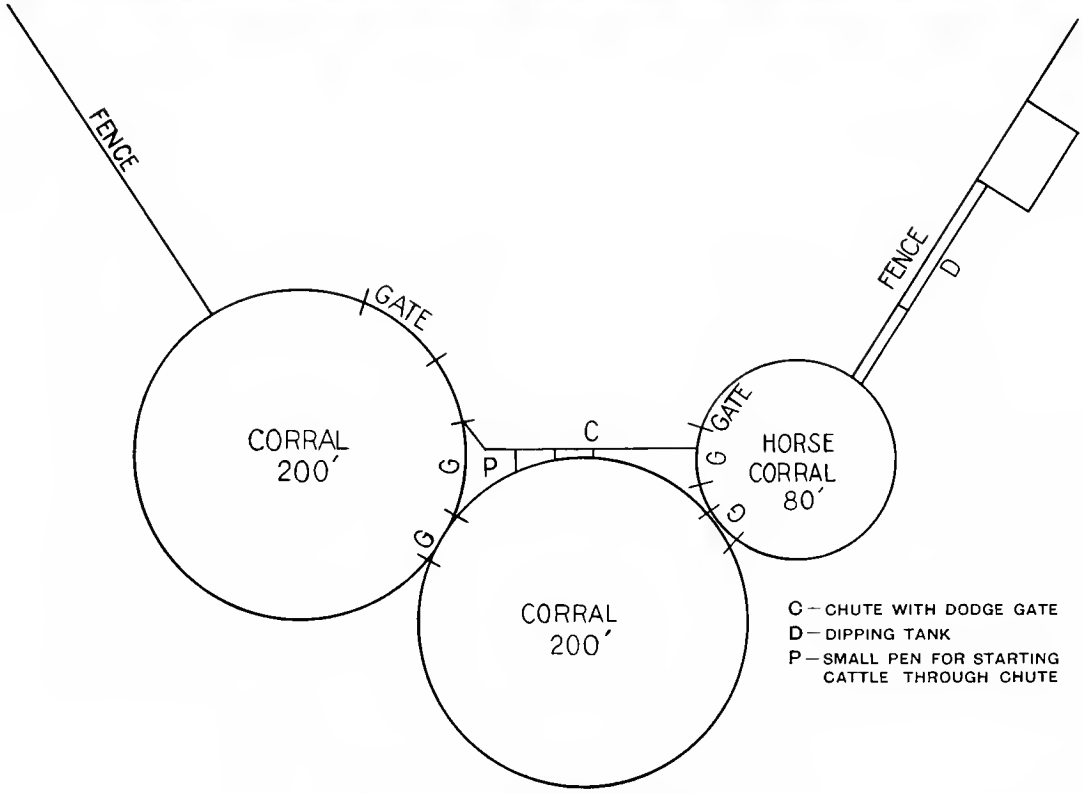
A MINNESOTA SELF-FEEDER FOR HOGS.



FLOOR PLAN OF DAIRY BARN FOR 20 COWS.

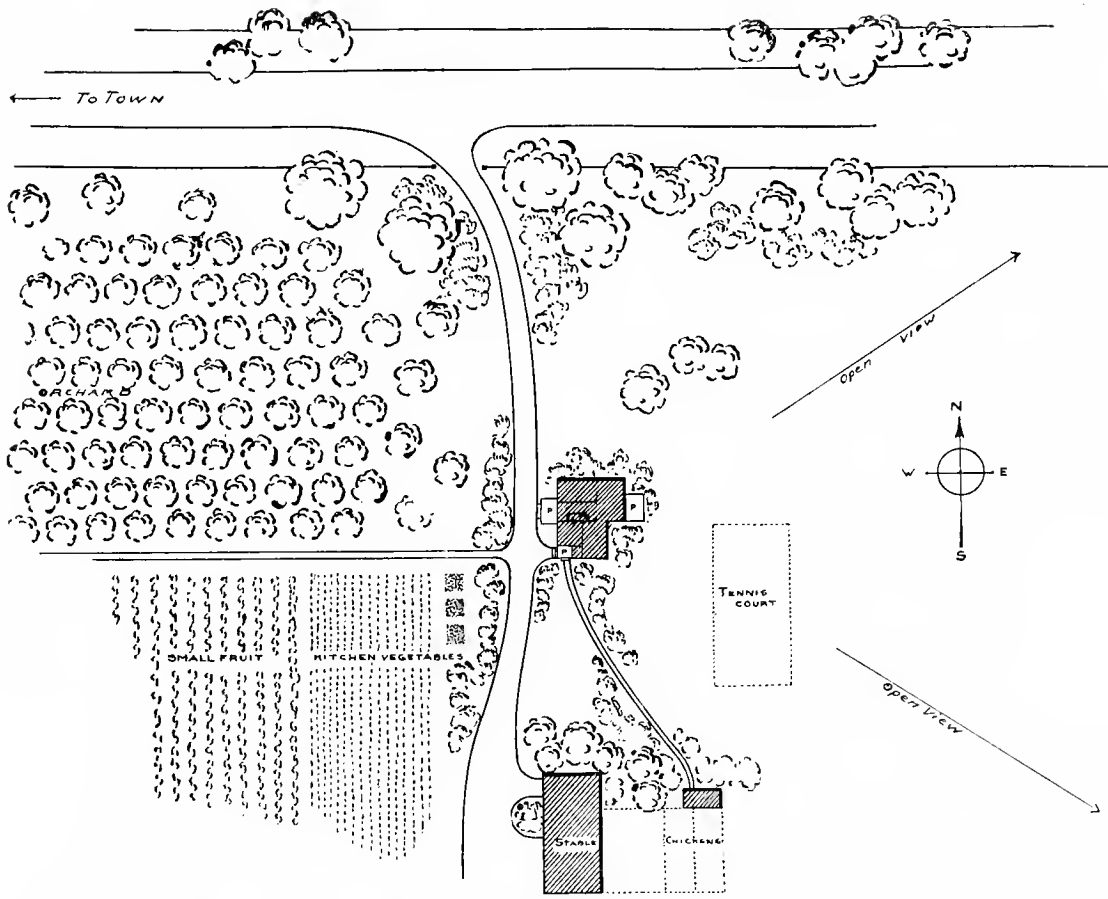
TWO LARGE BARNS ON FARM OF J. B. BURRIS, PUTNAM CO., IND.

GROUP OF FARM BUILDINGS ON THE GROUNDS OF THE TENNESSEE EXPERIMENT STATION AT KNOXVILLE.



ARRANGEMENT OF CORRALS FOR A RANCH.

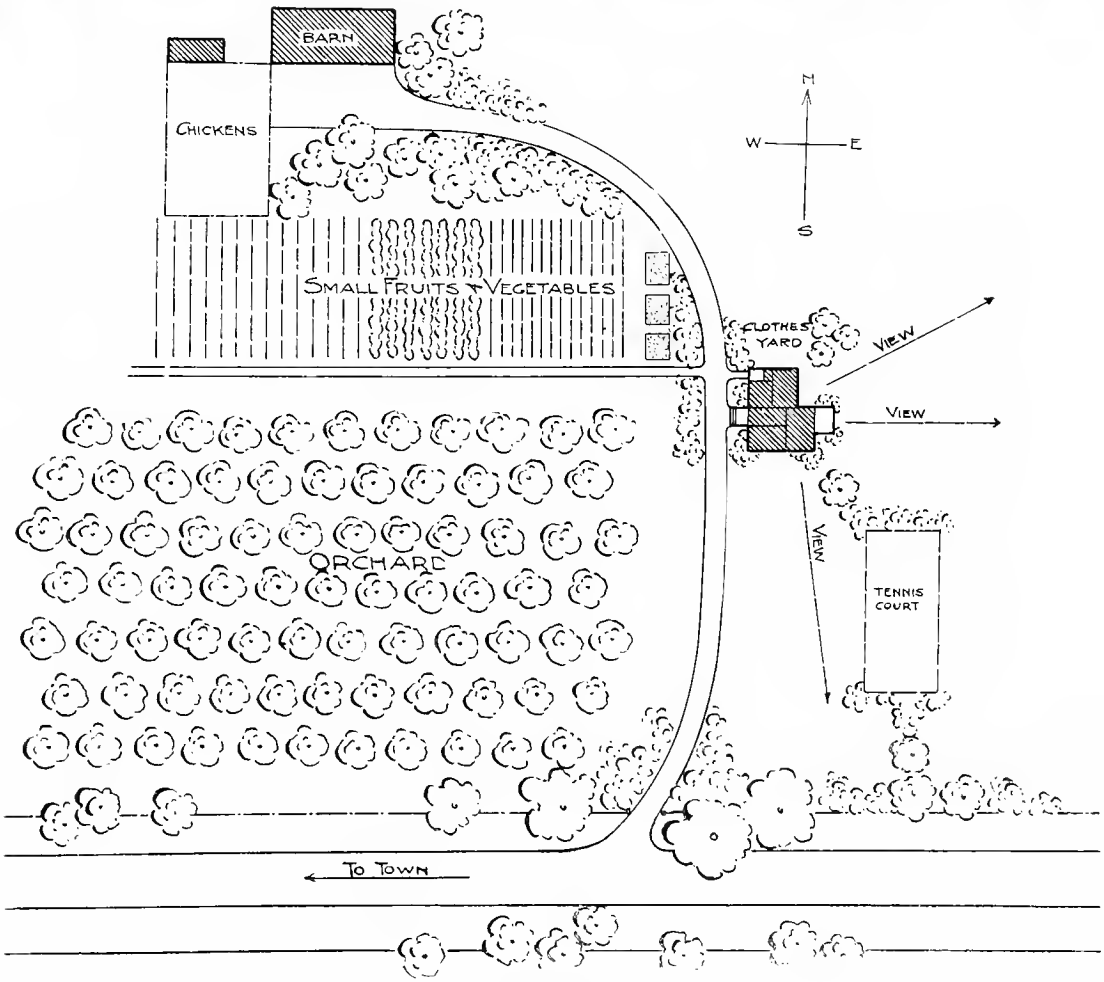
A SOUTHERN EXPERIMENT STATION BARN.



SUGGESTED ARRANGEMENT OF FARM HOUSE, BUILDINGS AND GROUNDS FOR A NORTH FRONT. SCALE 1 IN. TO 90 FEET.
(SEE PAGE 11.)

BARN AND YARD AT THE MINNESOTA EXPERIMENT STATION, ST. ANTHONY PARK.

DAIRY BARN AT TENNESSEE EXPERIMENT STATION.



SUGGESTED ARRANGEMENT OF FARM HOUSE, BUILDINGS AND GROUNDS FOR A SOUTH FRONT. SCALE 1 IN. TO 90 FT.
(SEE PAGE 11.)

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